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# THEXAGO DIESIEL DATA

# HOW TO SPOT FUEL INJECTOR PROBLEMS

The fuel injector is a most important and complex part of a diesel engine. The effects of a badly adjusted fuel injector can run all the way from increased fuel and lubricant consumption to ring and bearing failures.

Here are some of the characteristic symptoms you'll get if your fuel injector is acting up, and what the most likely cause of each symptom is.

 Symptom: Heavy black smoke at exhaust; loss of power; rough idling.

Probable Cause: Incomplete combustion, due to worn injector nozzle.

2. Symptom: Rough, noisy engine; stuck or broken rings; bearing failure in most severe instances.

Probable Cause: Pre-ignition, resulting from premature fuel injection. Causes extreme high temperatures and pressures in combustion chamber.

3. Symptom: Smoky exhaust; heavy soot deposits in engine and crankcase oil.

Probable Cause: Incomplete combustion due to late injection.

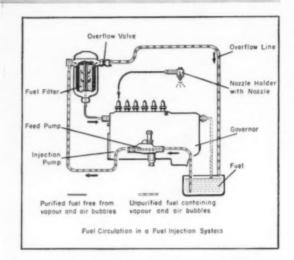
4. Symptom: Premature ring wear in some cylinders, heavy varnish formation in other cylinders; engine sounds uneven under load; white or light-blue smoke when engine is idling; dilution of lube oil.

Probable Cause: Improperly equalized injectors, which pump too much fuel into certain cylinders, starve others. "Over-fed" cylinders do most of the work.

Some of these symptoms can be cured with a comparatively minor adjustment; others require more involved techniques.

Improperly equalized injectors, especially on large engines, can be double-checked by a speed-drop test. This involves cutting out one cylinder at a time while you're checking the engine speed with a tachometer. The speed will fall off the most when you cut out the cylinders that are getting the most fuel.

Some folks try to get more power out of an engine by injecting more fuel than the engine was designed to take. You do get more power this way, but it's at the expense of your rings and bearings, and the exhaust becomes excessively smoky. The following chart shows the increase of ring temperature and exhaust smoke on a 4-cycle diesel experimentally overloaded with fuel:



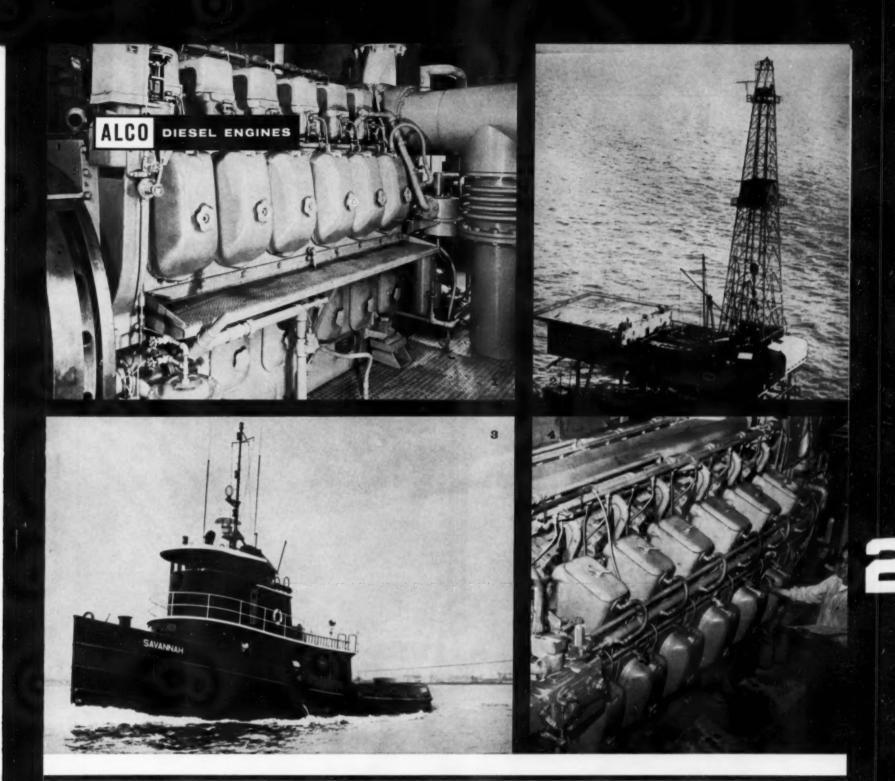
Fuel/Air ratio	% rated load	BMEP	% exhaust smoke*	Ring groeve temperature
.03	67	51	7	336
.04	100	76	7	372
.05	112	85	16	396
.06	114	87	69	402
.07	113	86	92	397
.08	111	84	97	388

\*Smokemeter reading.

Because a fuel injector is as carefully built as a good watch, it's best to let your manufacturer's service orgánization help you out with maintenance and repair problems. The most valuable type of preventive maintenance the diesel operator can do is to keep the injector clean. That means no disassembling of the unit in a dusty or otherwise contaminated atmosphere. It also means that you must use nothing but clean fuel. Contaminated fuel can ruin a fuel injector nozzle within a few days. You have to be particularly cautious if your injector isn't equipped with a dependable fuel filter. Water in the fuel is objectionable too, not only because it gives uneven engine operation but because it promotes corrosion of valve parts.

Fuel injector problems are best handled by trained experts. The same is true of diesel fuel and lubrication problems. Texaco has many, many years' experience in fueling and lubricating diesel engines of all sizes, in all types of operations. If you're having a problem with diesel fuel or lubricants, contact Texaco Inc., 135 East 42nd Street, New York 17, N. Y.





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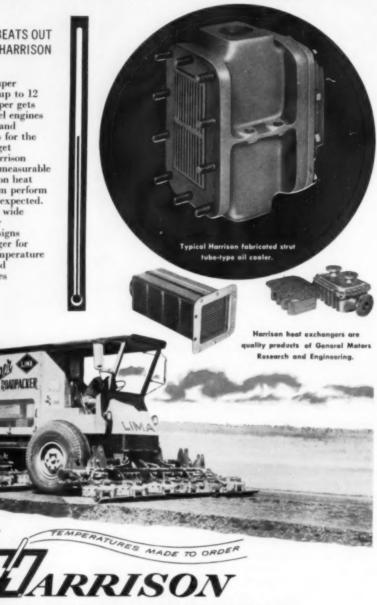
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**EXECUTIVE OFFICES** 

9110 Sunset Blvd. Los Angeles 46, Calif. **EDITORIAL OFFICES** 

1701 W. Wisconsin Ave. Milwaukee 3, Wisc.

**BUSINESS OFFICES** 

MILWAUKEE 3: Bruce W. Wadman 1701 W. Wisconsin Ave. Division 4-5355 LONDON E.C. 4: G. L. Fetherstonhaugh St. Paul's Corner Ludgate Hill City 5318

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#### FIELD EDITORS

HIALEAH, FLA.: Edwin Dennis 250 W. 50th St. TUxedo 8-2188

JEFFERSON CITY, MO.: L. H. Houck 400 Linden Dr. Phone: 6-2993 WALNUT CREEK, CALIF.: F. Hal Higgins 90 Grand View Place YEllowstone 4-9531

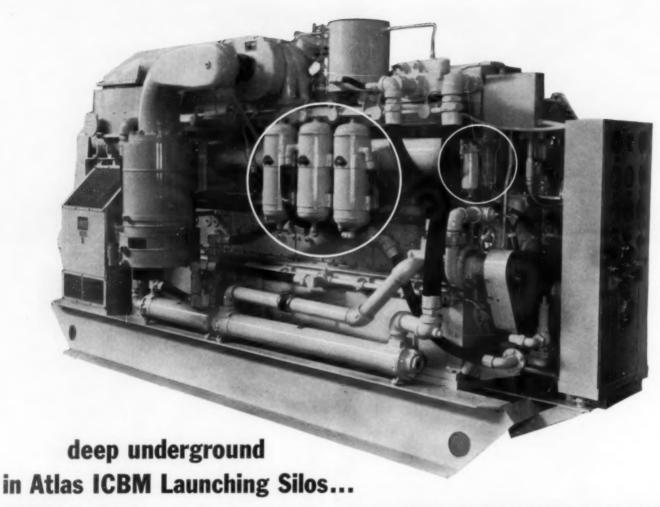
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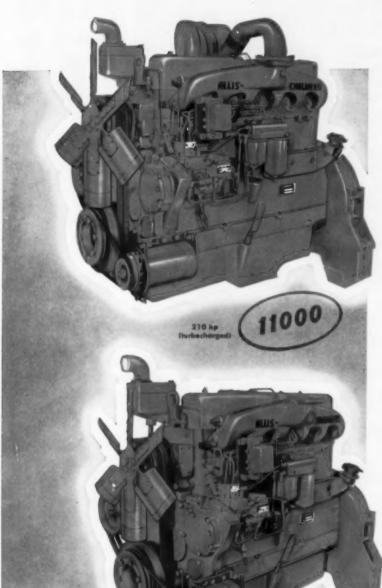


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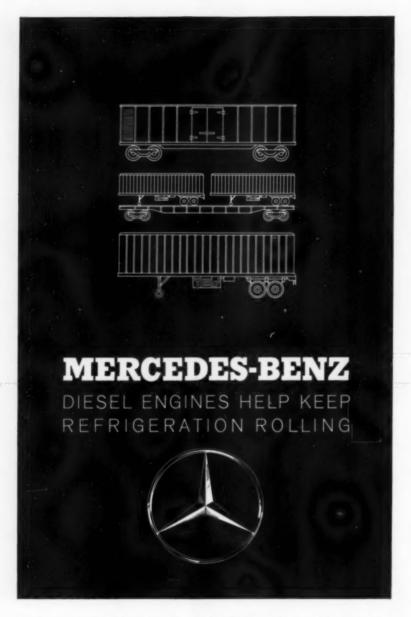
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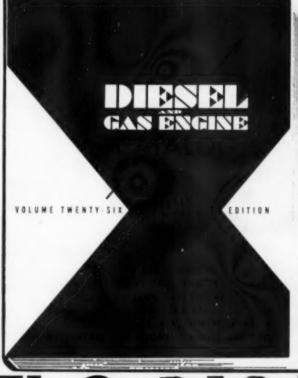
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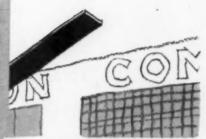
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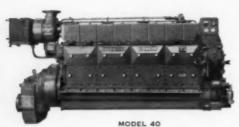


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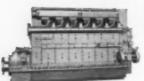
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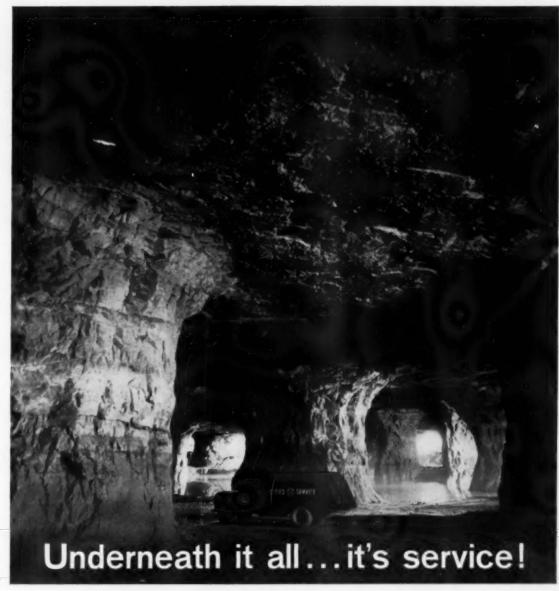
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60-8	8	360-514	495-700	350-500	930-1320	660-935
65-6	6	500-600	580-720	410-510	1105-1600	780-1130
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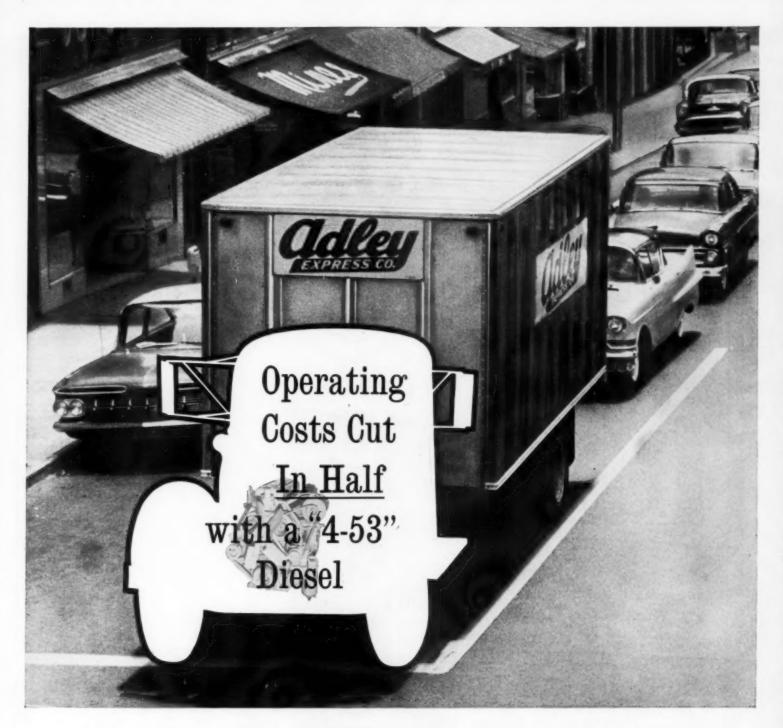
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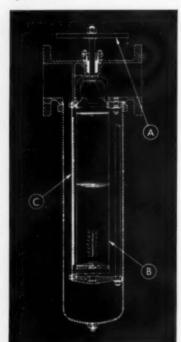
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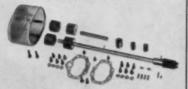
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513

# DREDGE ALASKA BOASTS OVER 8400 HP

A Trio of GM Cleveland Diesel Engines Totalling 8400 HP Provides Main Power for This Dredge Built By Todd Shipyards for Great Lakes Dredge & Dock Co., and Now Moving to Location of Its First Assignment

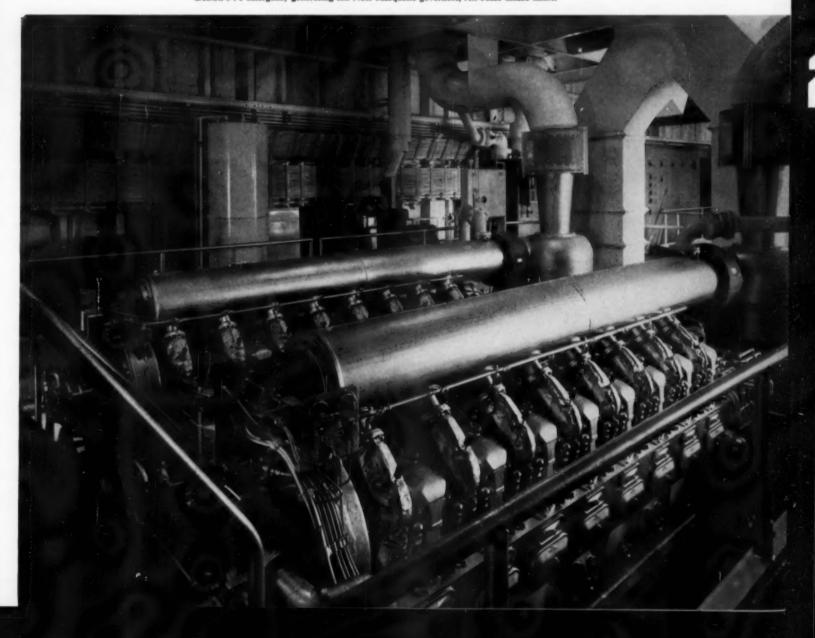
DASTING more than 8400 diesel horsepower and wearing a "made in Texas" label, the hydraulic dredge Alaska has been delivered to its owner, the Great Lakes Dredge and Dock Co., of Chicago, and is expected to go into service shortly in the Bay City, Mich. area. Built by Todd Shipyards Corp., in the firm's Houston yards, the Alaska is one of the largest dredges of its type built in recent years and is capable of operations anywhere in the world. All main power requirements are met by three GM Cleveland diesel engines. Auxiliary power is furnished by three GM Detroit Diesel engine generator sets.

Dimensions of the Alaska are 208 ft. x 46 ft. x 121/2 ft., and her normal displacement is about 2100 tons. When dredging channels, the Alaska can cut a swath ranging in width from 125 ft. to 350 ft. Normal dredging depth will vary from nine ft. to 50 ft. below water level, however spud and dredging ladder extensions were supplied which permit digging at a maximum depth of 85 ft. below the surface. Working at capacity and under optimum conditions, the new dredge is expected to dispose of up to 100,000 cu. yds. of material per day.

Two 16 cylinder, 2 cycle turbocharged model 498

GM Cleveland diesel engines, each rated 2800 bhp at 800 rpm, are connected through a common gear to drive the Ellicott dredge pump. Between the engine and gear input pinions are pneumatic disconnecting clutches, an arrangement which permits each engine to be started singly and operated over a speed range from idle to full speed. Both engines are necessary to carry the pump load at full speed; however, one engine can be operated at lower speeds when the pump load is within the capacity of one engine. A shear pin coupling is installed between the engine gear output shaft and the dredge pump to protect the gear and engines in case the

Pair of GM model 498, 16 cylinder turbocharged diesel engines, driving through a common gear, power the dredge pump on the Alaska. The engines are each rated 2800 bhp at 800 rpm. Pneumatic clutches between the engine and gear permits each engine to be started singly and operated over full speed ranges individually. At rear center is GM Detroit 3-71 emergency generating set. Note Marquette governors, Air-Maze intake filters.



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pump becomes jammed. The main dredge pump is a 33 in. dia. suction and 27 in. dia. discharge unit and is capable of driving the dredged material through the discharge pipe for as much as 4 mi.

Instrumentation, speed control and load balance control for both pump engines are located in a sound isolated booth on the upper engine room flat next to the pump engines and the pump.

The power for ship's service, spud and ladder motors, the cutter motor and the swing motor is furnished by the third 16 cylinder, 2 cycle turbocharged model 498 diesel engine, rated 2800 bhp at 720 rpm. This engine along with three General Electric generators direct connected in tandem, makes up a 40 ft. unit built on a common base.

General Electric designed the electrical system that includes stepless control from ac power for the ladder hoist and spud hoist drives, and de power for the cutter and winch operations. The decision to employ the ac reactor control system was based on ability of the system to provide close speed control for high accuracy plus the economic advantage of using less expensive ac rotating equipment. Officials of Great Lakes Dredge and Dock Company estimate that the use of stepless ac reactor control on the ladder hoist and spud drives alone will reduce maintenance expenses by 75 per cent. Completely stepless speed control of the spuds and 100 foot ladder can be achieved with the reactor controlled ac drive system. Drive motor for the ladder hoist is a 200 hp, wound rotor induction motor with primary reactors, secondary reactors and secondary resistors. The spud hoist is similar except with a 150 hp drive motor.

The first generator, coupled directly to the engine, is a 1250 kw, 600 volt, dc unit. This generator is used for powering the two 600 hp cutter head motors and is controlled by changing the generator field because the engine operates at constant speed. These heavy-duty, mill-type motors are mounted on the ladder and are coupled to the gear unit which in turn is coupled to the 14-inch cutter drive shaft. It was necessary for General Electric to custom build the twin-cutter motor drives. They are designed to operate efficiently when the ladder is tilted to its maximum of 60 degrees, exposing the motors to splash and spray under rough weather conditions. These motors are similar to the heavy-duty types used in steel mill applications. They are blower ventilated with high overload and high operating temperature characteristics, and are capable of withstanding mechanical shocks typical of cutter drives.

The second generator in line and coupled to the 1250 kw shaft is a 500 kw, 3 phase, 60 cycle, 440 volt ac generator. This unit furnished power for the spud motors, ladder motors, sea water pumps, air compressors, lights and other ac requirements.

The third generator in the lineup, coupled to the 500 kw unit, is a 200 kw, 250 volt, dc generator which supplies power to the 200 hp swing winch motors. As is the case with the first generator in line, the swing speed is controlled by changing the generator field. A belt driven exciter for controlling the 500 kw, ac generator is mounted atop this 200 kw unit.

Additional diesel equipment installed on the Alaska consists of two 8 cylinder, 8V-71 GM De-



troit generator sets for auxiliary power and one model \$-71 GM Detroit emergency generator set.

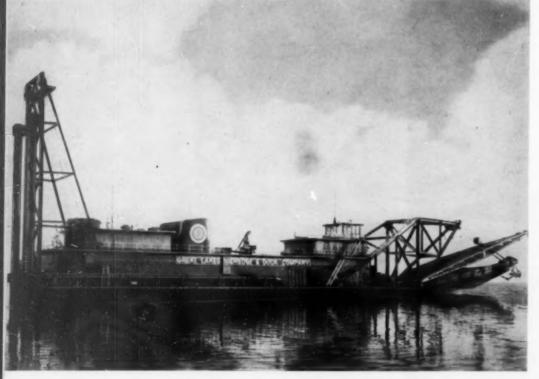
Most heavy equipment such as the main dredge pump, the three 2800 hp diesel engines and the main generators are installed beneath the main deck of the dredge. However all winches are located on the main deck along with a main pump engine control center, a main switchboard and motor control center for auxiliary electric motors, and a variety of machine tools for repair purposes.

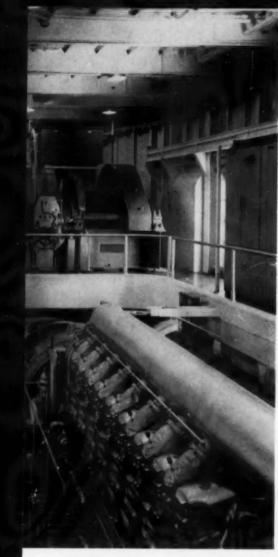
Covering most of the main deck is a 158 ft.x31 ft. machinery or deck house. Overhead in the deck house are two bridge cranes for handling stores and assisting with machinery repairs. One is a 15 ton all-electric crane and the other is a 5 ton hand operated unit. On top of the deck house stands a 25 ton LeTourneau revolving crane which can remove and reinstall the pump or pump parts through a hatch in the deck house roof.

Above the main deck are dual stacks and two upper deck houses. The after upper deck contains a galley, shower room, and two change rooms for crew members. In the forward upper deck house are the *Alaska's* business offices, staterooms and a glassed-in "lever room" or control cab.

The lever room serves as the operations center for the dredge. It contains controls, meters and other instruments conveniently arranged in "U" shape console to make it possible for one man (the

Dredge Alaska is one of largest of its type. Built by Todd Shipyards for Great Lakes Dredge & Dock Co., the Alaska has three GM Cleveland diesels for all main power.



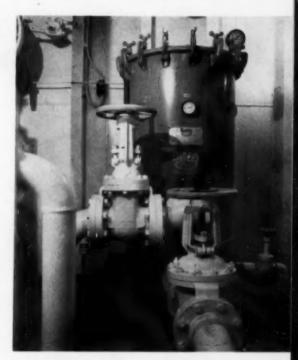


Third GM Cleveland diesel engine drives the three generators connected in tandem (shown below). This model 498 engine, 16 cylinder turbocharged unit, is rated 2800 bhp at 720 rpm. At rear of lower level can be seen one of two GM Detroit auxiliary generating sets with model 8V-71 engines. On upper level is spud drive machinery. On rear wall are GE resistors and saturable reactors which provide spud drive control.

leverman) to control all essential dredge operations—driving the cutter, working the spuds, swinging the dredge and hoisting the ladders. A gyrocompass supplies the leverman with course information and allows dredging operations to continue in all weather. Another unique feature is use of ultraviolet illumination on the lever room instrument panel. This "black light" eliminates inside window glare to contribute to the safety of night operations.

The Alaska "cut her teeth" in a series of successful tests conducted at the Todd plant. Her first job assignment will be a project at Bay City, Mich., scheduled to get underway on April 15. The vessel is non-propelled and will be towed from one job to another. Apart from the staterooms for officers and visitors, there are no living quarters aboard and the crew of 50 or more men will either commute from shore or live on tenders.

Great Lakes Dredge & Dock Co., is one of the nation's largest dredging companies and presently operates on the Atlantic and Gulf Coasts and in the Great Lakes area. Their fleet consists of 18 hydraulic, dipper and clamshell dredges, together with the necessary tugs, derricks, scows and other service vessels.



Each GM main engine on the dredge is equipped with a Briggs 16 element full flow lube oil filter.

Closeup of tandem generator arrangement on the Alaska. From front to rear are 1250 kw, 500 kw and 200 kw generators. Atop 200 kw unit is the exciter for controlling the 500 kw ac generators are mounted on a common base 40 ft. long.



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# "FUELS AND THE FUTURE" THEME OF OGP CONFERENCE

ECAUSE of the effect on the internal combustion engine industry of constantly changing fuel characteristics and supplies, the theme of the Oil and Gas Power Division Conference and Exhibit at New Orleans, La., is "Engine Fuels and the Future." Dates of the convention are April 10-13, 1961 and the Jung Hotel is the site of the meeting and exhibit.

The Technical Program Committee reports that the papers which are to be presented cut across the very heart of all segments of the internal combustion engine industry including engine builders and engine users as well as suppliers. The papers which will be presented should appeal to the interests of everyone concerned in any way with internal combustion engines. Papers run the gamut from highly technical treatises to practical dollar-and-cents case studies by operating personnel.

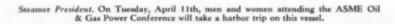
One of the outstanding features of the 33rd Annual Conference and Exhibit is the "Special Lecture" to be presented by Dr. Martin Elliott, Director, Institute of Technology, Chicago, Ill. His talk will cover the role of fossil fuels in supplying energy demands. He will further discuss projections of energy demands, the availability of natural petroleum and natural gas and the long range problem of synthetic liquid fuels and synthetic pipe line

gas from coal and oil shale. His talk will briefly touch upon nuclear energy. Competitive problems of the various fuels and a discussion of the economics of synthetic liquid and gaseous fuel production will be encompassed in his lecture. Dr. Martin indicates, also, that he may devote a portion of his talk to new power generation techniques such as thermo-electric devices, thermionic devices, fuel cells and magneto-hydrodynamic generators. Copies of Dr. Elliott's paper will be available immediately after his lecture.

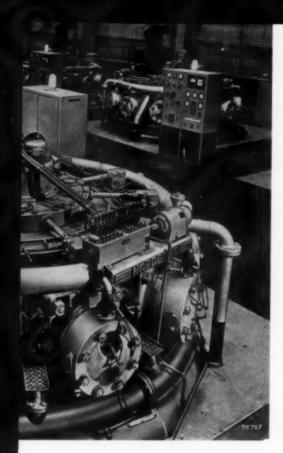
L. V. Armstrong and Dr. Paul H. Schweitzer have been nominated to receive the Oil and Gas Power Division Citations . . . "for distinguished service in the application of diesel engines for stationary and marine power and for significant contributions to the technical literature on diesel engine design and operation." Speakers' Awards will be presented to Fred A. Robbins for his paper "Piston Ring Design and Application Practices for Modern Large Bore Diesel and Gas Engines" and to A. N. Addie for a paper entitled "Design and Development of Turbochargers for General Motors Corporation's Series 567 Engines."

At each of the recent conventions, "What's New" has been an interesting and informative portion of the program. Each exhibitor is allowed three

minutes to discuss recent and significant developments for which his company is directly responsible. The popularity of "What's New" is manifested in the fact that some twenty companies made their terse presentations to capacity attendance during the 1960 Conference. "What's New" will again be one of the highlights of the New Orleans meeting.







An inspection tour through the Kaiser Aluminum & Chemical Corp., plant at Chalmette, La., is planned on a request basis during the OGP meeting. At this plant 80 Nordberg gasburning radial engines produce prox. 150,000 hp.

Vital to the conference are the exhibits that will bring a panorama of new ideas and wares to the attention of conference registrants and exhibit visitors. Here manufacturers of products and services can freely discuss their major advances. Here also is where the experts gather to look, learn and to exchange ideas while relaxing in the individual exhibits and during social hours in the exhibit area. As of December, 20 companies will be represented with exhibits: Van der Horst Corp. of America; The Cooper-Bessemer Corp.: The Bendix Corp. Scintilla Div.; Reagan Equipment Co.; Koppers Co., Inc.; Wm. W. Nugent & Co., Inc.; American Bosch Division; Harper Packing Co.; Amot Controls Corp.; Diamond Chain Co., Inc.; The Hilliard Corp.; Alnor Instrument Co., Div. of Illinois Testing Lab.; Engineering Controls, Inc.; Woodward Governor Co.; Ren Equipment Co., Inc.; Robertshaw-Fulton Controls Co.; Nordberg Manufacturing Co.; Wilkening Manufacturing Co.; North Electric Co.; Fairbanks, Morse & Co.; and Autonetics Division, North American Aviation Co.

Typically, the companies represent the industry as a whole, encompassing engine builders and suppliers. Mr. J. T. Adams, chairman of the Exhibits Committee states that the exhibit arrangements at the Jung Hotel are ideal inasmuch as conference attendants enter and leave the technical sessions through the exhibit area providing a distinct advantage for the exhibitors. A reproduction of the exhibit area is shown at right. As in previous ASME-OGP exhibits, a registration fee is not required of those visiting the displays only.

Mr. Harold Sennstrom, Chairman, expressed great

enthusiasm about the plans as they were finalized for the 33rd Annual Conference and Exhibit. He states "Every engineer who attends the Conference and Exhibit will certainly gain much of value which can be applied to the solution of his daily problems." Here in summary form is the technical program that will be presented:

#### MONDAY MORNING

ONDAY MORNING
Operation of Dual-Fuel Engines in Pipe Line Service—
Erik Kelgard, Trans Mountain Oil Pipe Line Co., Kamloons, B. C., Canada,
Application of a Resilient Coupling to Avoid Resonance
in a Diesel Engine Installation—A. S. Herman, Koppers
Company, Inc., Metal Products Division, Coupling Department, Baltimore, Md.

#### MONDAY AFTERNOON

Turbocharger Selection, Matching, and Development for Two-Cycle Spark Ignited Gas Engines-W. H. Payne, G. H. Bollman, and R. L. Johnson, Clark Bros. Co., Olean, N. Y.

Olean, N. Y.

Operation and Maintenance of Metallic Rod Packings for Reciprocating Compressors—Gilbert Wilkes, France Packing Co., Philadelphia, Penn.

Wave Phenomena and Conditioning of Induced Air and Exhaust Gas in the operation of Internal Combustion Engines—B. G. Golden, Burgess-Manning Co., Dallas, Tex.

Special Lecture to be presented by Dr. Martin Elliott, Director, Institute of Technology, Chicago, Illinois.

#### TUESDAY MORNING A Multifuel Engine

Multifuel Engine Experience-Walter F. Isley, Con-cental Aviation & Engineering Corp., Detroit, Mich. Cycle Analysis from Combustion Equations—Leo Brinson, Nordberg Manufacturing Co., Milwaukee, Wis.

#### TUESDAY AFTERNOON

#### WEDNESDAY MORNING

Evolution and Development of a 900 HP Marine Diesel Featuring Ruggedness and Serviceability in a 4½ LB/ HP Package—L. D. Thompson, E. Traskiris, L. Weschler, Curtias-Wright Corp., Utica Div., Utica, Mich., Bureau of Ships, Navy Dept. Trend in Marine Diesel Fuel for the Navy—Eugene C. Davis, Bureau of Ships, Code 634A, Washington 25, D.C.

#### WEDNESDAY AFTERNOON

Electrochemical Cylinder Corrosion J. M. A. van der Horst, W. A. Schultse, Van der Horst Corp. of Ameri-ca, Olean, N. Y. The Performance of Four-Cycle Gas Engines on Different Fuels—C. E. Holvenstot, Ingersoll-Rand Co., Painted Post, N. Y.

#### THURSDAY MORNING

The Way to Automate . . . A Diesel Utility—Reid Hamilton, The Cooper-Bessemer Corp., En-Tronic Controls Div., Mount Vernon, Ohio, Automatic Gaseous Fuel Controls—Ralph G. Abbott, American Bosch Division, Springfield, Mass.

Current Trends in Engine Control Application—C. R. Carmichael, Amot Controls Corp., Richmond, Calif.

Not to be overlooked are the social events which have been planned by the New Orleans Section.



Meeting place for the 33rd Annual Conference and Exhibit of the OGP Division will be the Jung Hotel.

To date these are the events which warrant greatest interest:

Sunday, April 9th Get Acquainted Party will be held at the Jung Hotel in the evening.

Menday, April 10th—Ladies tour of Garden District homes, leaving hotel at 1:30 p.m. The tour will end in the vicinity of Commander's Palace where coffee and sherry will be served on the patio.

Tuesday. April 11th—Ladies will be bussed to Esplanade Wharf, about 11:00 a.m., where they will tour the Historic River Queen and will enjoy a luncheon on board. Following lunch ladies join the men for a harbor trip and social outing on the Stemen "President." In the offing during the harbor trip is the possibility of a demonstration of the new Higgins Industries boat with Hydrofoil hull.

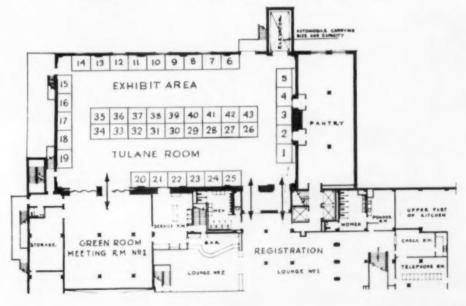
Hydrofoll hull.

Wednesday, April 12th—Ladies will be taken to "Breakfast at Brennan's" on Royal Street at 10:00 a.m. and continue on a "French Quarter Patte Teur."

Annual OGP Division Banquet will be held at 7:00 p.m. with H. R. Sennstrom, chairman OGP, presiding. Presentation of the honors and awards will be made during the banquet.

On Monday, Wednesday and Thursday the OGP Division will sponsor its usual "Social Hours" in the exhibit area. Also under consideration, but limited to specific request, will be arrangements to visit the Kaiser Aluminum & Chemical Corp. plant at Chaimette, La., where 80 Nordberg gas-burning radial engines produce approximately 180,000 hp.

Diagram of exhibit area and meeting area for OGP meeting at Jung Hotel.



# "ASPHALT CONVEYOR LINE" PROVES DIESEL ECONOMY

By ANTHONY A. ALBERTE

N recent months diesel tractors have been turning in performances in a unique short haul, light load application that illustrates the need to match the right unit to the demands of the job. And confidence in figures that indicated the benefits possible, even when persons experienced in diesel operation were unsure that use would be economical, is a gauge of how a major U. S. company was rebuilt by leadership and a willingness to abandon old standards.

Every automobile buff knows the wonderful success story of American Motors—the independent producer that pioneered the modern compact car in this country in 1950 with introduction of the Rambler. But it wasn't until 1957 that America's auto buyers really discovered the Rambler; retail sales of the auto reached 100,000 that year. In 1958 sales doubled and in 1959 climbed to 368,464, an all-time high for an independent producer. Today American Motors is Wisconsin's largest employer, with over 18,000 persons at work in the company's plants in the state.

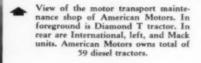
Putting an automobile together is a modern miracle of closely timed industrial planning and, in the case of American Motors, complicated in that their main body plant in Milwaukee is at the other end of an "asphalt conveyor line" 44 miles from the main assembly plant in Kenosha. A new body plant at Kenosha to supplement the Milwaukee production went into operation in 1960 but the major portion of body production still comes out of Milwaukee. Units built in the Milwaukee plant are trucked to Kenosha where they go onto the assembly line. And, with American Motors auto production about 1,400 per day, those bodies must arrive as scheduled. Production schedules call for arrival of a six or eight-body trailer at the main plant every six minutes.

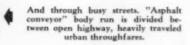
Now, a fleet of brand new diesel tractors have replaced the old gasoline tractors that handled the Milwaukee-Kenosha body haul for many years. And thereby hangs a tale of fitting the machine to the job. And there's another tale that more and more is typical of diesel units: once on the job, diesel proves out its economy. We went to Kenosha recently to talk over conversion of the fleet to diesel with Larry Hasslinger, materials handling project engineer, who was responsible for details and specifications of the conversion.

Nash Motors, predecessor of American Motors, was once one of the country's major truck producers (in World War I days). But, Nash, after that war,









limited itself to overseas truck sales and, for many years, the only Nash trucks on the road in this country were on the 44 mi. body run between Milwaukee and Kenosha. These were all gasoline units. As the years went by and wear and tear took its toll, replacement became an economic necessity. Enter diesel tractors.

"When we talked diesel with some of our trucking friends they were doubtful that diesel operation on the short body run and with as light a load as we carry would pay out," Hasslinger said. But





How much can wind resistance—or more properly, turbulence—affect tractor performance and thereby unit speed? Well, in the testing that followed, one truck manufacturer loaded a flatbed trailer with a 30,000 lb. load, then erected a 14 ft. bulkhead at the front of the trailer. The tractor had no trouble at all in pulling at 65 mph. But when the researchers cut four six inch holes, one in each corner of the bulkhead, turbulence, hence drag, was created and top speed dropped 10 mph.

So, with the problem pinpointed the solution was simple—bigger engines. In the past two years the company's motor transport department has purchased 59 new diesel tractors, 27 of them Mack model N61T's with Mack's Thermodyne ENDL-673 engine rated 170 hp. Twenty-four of the tractors are Internationals; 15 model DCO-205H with Cummins NHE-195 engines rated 195 hp and nine model CO-192A's with Cummins C-175 turbo-charged engines. Eight of the diesel units are

Interstate Highway 94 is connecting link between Milwaukee and Kenosha. Open construction of trailers created high turbulence which produces drag empty or loaded, requires plenty of engine power despite light 14,000 lb. maximum load. Trailer carries eight Rambler bodies.

Mechanics make adjustments during routine PM check. Maintenance cycle on the fleet is laid out in 12 week term with tractors put through one check each week rather than on mileage basis.

the figures indicated that, despite the short runs and light load, operating economies should be expected and the order went through for the first 24 diesel tractors.

Before we go on, let's look at some of the data involved in the body run because there are a few "foolers" in the weight and load characteristics. The trailers pulled by the American Motors tractors carry eight Rambler bodies. (Several six body trailers are still used but are being replaced by the larger ones). The trailer goes to 52 ft., which gives total unit length of just over 62 ft. Bodies are loaded on the trailer at Milwaukee plant from which the driver must wheel this load along carefully mapped routes through Milwaukee, from north to south, then onto Interstate 94 for the run south to Kenosha. About one-third of the 44 mi. route is through normally heavy city traffic with accompanying stop-and-go characteristics, the balance on the brand new Interstate 94 and connecting roads. Gross combination weight of the loaded unit is what misled the engineers: only 37,800 lbs. Payload is a maximum 14,000 lbs. depending on the type of body being hauled.

Once the decision to use diesels was reached, the rest seemed simple: Haul a 14,000 lb. payload at only 45 mph? A case of simple mathematics: this much weight and this speed requires this horsepower. But it wasn't that simple. Because the wind, whistling around the stakes and braces and struts of the open trailer, set up so much dragproducing turbulence the engines worked overtime to keep tractor-trailer combinations (and the trailer empty was as big a problem as loaded) moving on schedule. Diamond T model 723C's and these too have Cummins C-175 engines underhood.

Of the diesel tractors, 31 are used on the Milwaukee-Kenosha body run, 17 others pull single axle trailers on freight runs in the Kenosha area, two haul tandem-axle trailers on general freight runs, and two more haul single axle trailer vans on general freight runs and the balance are stand-



bys. Tractors are not normally assigned on a specific run but are used interchangeably, depending on the production and maintenance schedule.

Now to economics. Before American Motors decided to make the switch to diesels on the body run they put them to the test—operating diesels and gasoline models over the same Milwaukee-Kenosha run under the same conditions. They bought 24 new diesel tractors, eight each of the Macks, Diamond T's and Internationals, and seven each of two models of gasoline tractors. Mr. Hasslinger and his associates kept careful records of all costs involved and their figures are a real testimonial to diesel savings. Here, for the record, are a few figures pointing up diesel economy in a service that few engineers would have agreed diesel could handle economically only a relatively short time ago:

11/1/59 to 3/60	14 gasoline tractors	24 diesel tractors
Total miles	540,695	858,469
MPG, fuel	5.083	7.102
Cost/mi. (cents)	6.499	4.603

The cost/mi. figures do not include tire costs but include maintenance and all other operating costs.

And later figures show that the diesels are continuing to turn in impressive figures. Figures compiled after American Motors had purchased another 35 diesel tractors:

11/1/59 to 9/30/60	59 diesel tractors
Total miles	2,464,258
MPG, fuel	8.157
Cost/mi. (cents)	4.500

Total fleet mileage, including both gasoline and diesel units, averages about 600,000 miles a month. The diesel units alone account for about 500,000

American Motors uses complete set of charts for PM checks. This is sample of "A" check sheet.

Planning schedule of body hauling and freight hauling are, from left, John Greno, fleet superintendent; Maxwell Watkins, record clerk, Harold Johnson, dispatcher and Robin Cooper, Jr., asst. fleet superintendent.

miles of that figure. Since the first of the diesels were acquired in late 1959 none had accumulated as much as 100,000 miles when we visited American Motors. Units on the body run average between 10,000 and 11,000 mi. per month.

Routine preventive maintenance servicing of the diesels (except lube oil changes) is done on a time basis within a 12 week cycle rather than on a mileage basis. Thus each unit is in the garage every week and goes through one of four check procedures. Each succeeding check includes the next lower service. Thus, the "B" check also includes steps performed in the lube and "A" check. Maintenance men use Mack standard diesel tractor PM forms.

A record is kept of every check and, in addition, each check sheet shows the mileage of the last oil change for the engine. Oil changes are made at 4,000 and 8,000 mi., depending on the unit. When a tractor comes in for a check, a transparent envelope showing the check sheet is hung on the unit along with the keys. Luber-finer oil filters are standard on all units. Dry type and oil bath air cleaners are used, depending on the unit.

The firm's motor transport department is headed by General Foreman, John Greno. Howard Schultz is maintenance foreman.

No. of	Tractor Make & Model	Engine Make, Model & (HP)	Clutch	Transmission
8	Diamond T, 723C	Cummins, C-175, (175)	Rockford, TT, 14 in.	Spicer, 5 speed
9	International CO-192A	Cummins, C-175, (175)	Rockford, TT, 14 in.	Spicer, 5 speed
15	International DCO-205H	Cummins, NHE-195 (195)	Rockford, 14", 2-plate	Spicer, 5 speed
27	Mack, N61T	Mack, ENDL-673, (170)	Mack, CL-28	Mack, 10 speed



# MILLIPORE TEST SHOWS EFFICIENCY OF DRY TYPE AIR FILTERS

By ROBERT E. SCHULZ

IR ECENT years have shown a marked increase in the popularity of dry type air filters—a popularity attributed directly to efficiency and maintenance economy, and indirectly to the cooperative work of the filter manufacturers, engine and engine-powered equipment builders, and the operators. Following our pattern we have regularly brought to your attention new developments and applications as they are made. In this article we take you into the field for a look at heavy duty dry type air filters on diesels in rugged aggregate plant service. Making the trip with me is Art Kaser, who is an application engineer for Purolator Products Co.

In conjunction with the development of its line of heavy duty dry type filters, Purolator has also produced a very accurate piece of equipment for testing filter efficiency employing the Millipore Sampler. To see this device in action plus several applications of Purolator's new model AF1416 micronic two-stage filters, we went to Towson, Maryland to meet with officials of Harry T. Campbell Sons' Inc. The mill and quarry at Texas, Md. is the largest of the company's nine plants and specializes in specification aggregate for highway and general construction. Other products in the company's overall line include ag-lime, ready-mix, asphaltic concrete, calcium carbonite plus the regular run of sand, gravel and crushed stone. A better area for testing dry type filters could hardly be found.

Harry T. Campbell Sons' Inc. started using diesel equipment back in 1927 when they purchased a single cylinder 150 hp Ingersoll-Rand for primary crusher drive. The first diesel truck, a BX Mack with 150 hp Cummins diesel, started service in 1942. Today, almost all of the equipment is dieselized—compressors, shovels, crushers, pumps, quar-

ry haulers, front loaders, dozers, ready-mix trucks, etc. In total, there are 75 pieces of diesel equipment at the Texas, Md., operation. With the exception of the fuel injection pumps and nozzles, all of the maintenance work is handled in a well-equipped and staffed shop headed by foreman George Riley. I talked to Mr. Riley, and later to general superintendent Ed Reichart about their preventive maintenance program specifically as it related to their fleet of quarry trucks since they are subject to the most rugged operating service.

To meet their present production requirements the firm is operating 19 trucks in shuttle service between the pit and the primary crusher at the top quarry level. Each truck averages eight round trips per hour over rough, unfinished roads where the grade in some areas runs 14 per cent. The trucks operate eight hours per day, each logging up to 2000 hours per year. The fleet is as follows:

At its Texas, Md. plant, Harry T. Campbell Sons' Inc. operates a quarry fleet of 21 diesel trucks. One of four 36 TD Euclida dumps its 22 ton load at the primary crusher.



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4–22 ton 36 TD Euclids with Cummins NHRS or NRTO diesels (320 to 335 hp); Allison 3-speed Torquatic transmissions

4-27 ton R27 Euclids with Cummins NRTO, 335 hp diesels and Allison 5640 4-speed Torquatic transmissions

6-16 ton FW Macks with Cummins 150 hp engines and Mack transmission

3-16 ton FJ Macks with Model H, 150 hp Cummins diesels and Mack transmissions

2-30 ton LR Macks with Cummins NRTO, 335 hp diesels and Mack transmissions





Large and impressive, the floor of the quarry at Texas, Md. is more than 200 ft. below ground level. Mill in far background produces crushed stone, calcite products, bituminous concrete, and portland cement concrete.

Shop foreman George Riley left, and General Superintendent Ed Reichart of Harry T. Campbell Sons' Inc. in the mill yard.

Closeup of the Purolator AF 1416 heavy duty two stage dry air filter on 36TD Euclid. Test conducted shows efficiency of 99.87 percent in 2-5 micron range.

Discussing the operation of these trucks with foreman Mr. Riley, he pointed to an approaching truck and following cloud of dust as full evidence of the company's need for efficient air filtration. According to Mr. Riley, "It isn't economically feasible to control dust on these quarry roads, and even if it was, we'd still have a lot of dust to contend with during the loading operation. We've found that heavy-duty dry type air filters do the job the best." Checking his shop records on some of the quarry trucks, he pointed to his 8000 hr. overhaul schedule. "Since we're keeping more of this abrasive dirt out of the engines, I fully expect that we'll be able to considerably extend this overhaul period. None of the trucks with the dry type cleaners have come up for overhaul yet, but on spot maintenance, plus lube oil filter change, we can see that we've got a cleaner engine. In addition," Riley stated, "We figure that the dry type units save us about two hours each per week in servicing, plus the cost of the oil." Presently Campbell's is running the filters about six to eight weeks between checking air restriction, with 15 to 20 weeks between manometer checks.

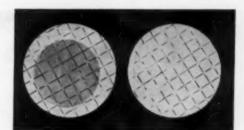
Out at the primary crusher dump, we stopped one of the three 36TD Euclids equipped with the Purolator AF 1416 two-stage filter to run a test with the Millipore Sampler. This was truck No. 153, the first to have the AF 1416-installation taking place in May, 1959. Now the model AF 1416 is one of the new dry type cleaners in the Purolator heavy duty line. First and second stage elements are of the telescoping type, as described on page 53 of our June 1960 issue. Built for both horizontal and vertical mounting, the AF 1416 is of the latter type with top inlet and side outlet. It has an overall height of 26.25 ins. and a diameter at the inlet of 18 ins. A check of foreman Riley's records showed that this unit on Truck No. 153 operated up to 1600 hrs., going from the 6.2 ins. restriction at installation to 17 ins., before





pumps, control switches, two standard millipore samplers with filtration discs, and two lengths of 3/a in. dia. plastic hose. In making the test, Mr. Kaser attached the device to the truck and then connected one of the lengths of tubing to the inlet manifold of the Cummins diesel, and the other tubing to the inlet of the air filter. This provided us with both an "upstream" and "downstream" sample. Twelve volt current for the unit's pumps was supplied by a hook-up with the truck's light system. After the truck had made two regular runs between the shovel and the crusher (approx. 15 min.), the positive filtration discs with max. pore openings of 0.45 microns were removed and we took them up to the maintenance shop for examination under a portable microscope. The discs were then subjected to full laboratory examination and evaluation.

During the test period, 9 cu. ft. of air passed through the tester, based on maximum pump capacity of .6 cfm, while the diesel used 10,125 cu. ft. of air (Cummins NHRS rated at 675 cfm). Therefore the sample of dirt which appears on the disc illustrated represents only 1/1125 of the dirt which actually went into the air intake during the 15 min. test. Here is the laboratory analysis:



Closeup of the two millipore filter discs taken after test.

Micron Range of Particles	$\mathbf{P}_{i}$	$P_z$
2- 5	414.816	528
5-10	204.624	384
10-20	70,560	240
20-40	600	9
40-80	143	5
Over 80	15	3

P<sub>1</sub>-Sample taken at inlet to Purolator filter AF 1416

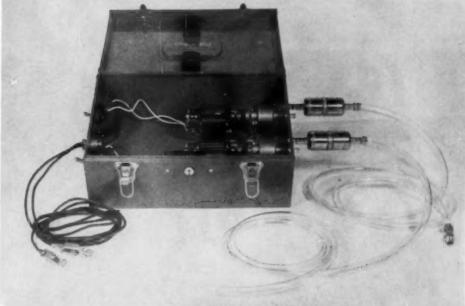
P,-Sample taken at inlet to engine

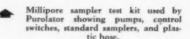
The following data was obtained from the results of the microscopic count of the particles on the two discs:

Micron Range of Particles	% Particles Retained	% Particles Passing	
2- 5	99.87	0.13	
5-10	99.81	0.19	
10-20	99.66	0.34	
20-40	98.5	1.5	
40-80	96.5	3.5	
Over 80	80.0	20.0	

Satisfied with the efficiency of dry type filters, plus the savings in maintenance, plant superintendent Mr. Reichart believes that eventually he will switch all diesel equipment to these types of units. This trend is also reflected in Campbell's ready-mix fleet at Texas, Md., since 25 of the 33 mixer engines are now equipped with Purolator single-stage dry type filters.

Harry T. Campbell Sons' Inc., of course, is only one example of the way manufacturers and operators work together in their mutual interest. It is, however, a good one and very indicative of the progress being made in filtration technology which benefits the entire industry.





Northwest shovel with Murphy diesel at lower pit level loads 36TD Euclid during test run with sampler device. New R-27 Euclid with Cummins NRTO, 335 hp diesel waits to right.

the first stage unit was cleaned and returned to service. The unit now has 2000 hrs. on it and the next service point is estimated to be 2400 hrs.

The Millipore Sampler test kit, as shown in the illustration, consists of two small electrically driven



# ENGINES DRIVE GIANT PUMPS IN LOUISIANA FLOOD CONTROL AREA

POUR giant, 116 in. propeller pumps, each powered by its own 1000 hp diesel engine, have been placed in operation as part of one of the most ambitious flood protection undertakings in the Gulf coastal area. The installation is at the new Kayouche Coulee pump station at Lake Charles, La., and is the latest in a series of flood control measures begun at Lake Charles six years ago. The pumping station will help protect a wide area of southwestern Louisiana from inundation and supplements a gravity drainage system which provides a run-off capacity of 7200 cu. ft. of water per second.

The pumps and the engines were all built by Fairbanks, Morse & Co., at the firm's Beloit, Wis., works. Each of the pumps, largest built of cast iron by Fairbanks-Morse, is driven by an F-M 1000 hp (at 750 rpm) opposed piston diesel engine. These six cylinder engines, model 38D81/8 units, have bore and stroke of 81/8 x 10 in. They are dual fuel units but at present operate solely on

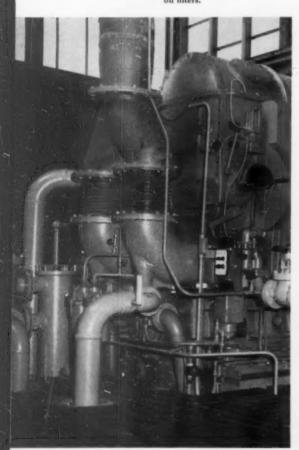
diesel fuel. Natural gas for engine operation will be available in the future on completion of a pipeline to the station. Each engine drives its pump through a Falk flexible coupling and Morse chain drive.

Capacity of each pump is 405,000 gpm and the four together can pump 1,615,680 gals. of water per minute (900 cfs at 4 ft. head) out of the City of Lake Charles, the Chennault Air Force Base and other land within the immediate area of about 12 sq. mi. If the pumps operated steadily for a day they would discharge 2,326,600,000 gals., about 232 times the average daily water consumption of the city of New Orleans. Or, to put it another way, this discharge would flood 7,142 acres one ft. deep in a day. Thus the new pumps can handle 10 and 12 in. rains in three or four hours.

The horizontal, axial flow pumps, have cast steel propellers and have suction and discharge pipes 12 ft. in diameter. The engine-pump installation is the largest in the system of Gravity Drainage District Four of Calcasieu Parish and is among the largest of its type in the south.

Abnormally high levels in the Calcasieu River are caused frequently by sustained southerly winds which literally pile up the water, or by heavy rainfalls north of Lake Charles, or by a combination of these causes. In these instances it becomes necessary to close the protective flood gates. During these periods any rains in the city must be removed by pumping over the protective levees. The Kayouche Coulee station discharges into English Bayou; a mid-city station with electricallydriven 60 in. F-M pumps discharges into Lake Charles. H. E. Hanson, vice president in charge of Fairbanks, Morse's Beloit works, emphasized at dedication ceremonies for the station that the Kayouche Coulee pumping installation is independent of outside power sources. Thus it can operate throughout a hurricane when the need for uninterrupted pumping is greatest.

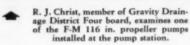
Exhaust end control side view of one of four Fairbanks, Morse 38D8½ engines in Kayouche Coulee pump station. Note Woodward governor. Engines are also equipped with Purolator lube oil strainers, Hilliard lube oil filters.

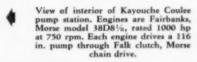




DIESEL AND GAS ENGINE PROGRESS







Exterior view of pump station showing Burgess-Manning exhaust silencers.

Completion of the station culminated a Lake Charles civic campaign aimed at eliminating floods which shut the runways at Chennault Air Base and plagued the city and its environs. The campaign, conducted in 1955, resulted in approval of an \$8,170,000 drainage issue.

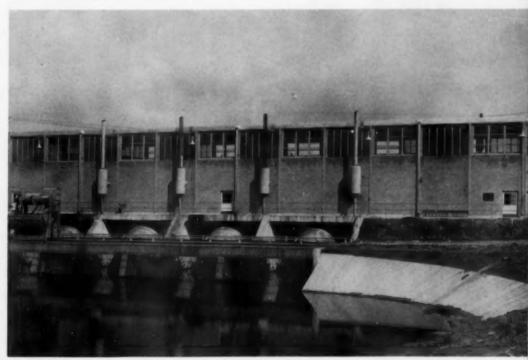
Approval followed an Air Force statement that it would close the air base unless given assurance that the flood conditions would be removed. Despite its lease on life given five years ago, the air base is scheduled to close in mid-1962. But civic leaders point out they now have the advantage of being able to offer replacement industry the inducement of flood-free area. In addition homebuilding can stretch safely into the countryside because of protection despite low levels.

Engineers for the project were Rodney M. Vincent and D. W. Jessen and Associates, Lake Charles, while the contracting firm was F. Miller and Sons, also of Lake Charles. Jessen stated that some of the houses now protected are at Elevation 8 whereas the backwater flow from the bayous and coulees in the flood of May, 1953 reached Elevation 14, putting them under six feet of water and flooding 2500 houses.

#### Principal Equipment Kayouche Coulee Station

Engines and pumps Fa	irbanks, Morse
Couplings	Falk
Governors	Woodward
Lube oil strainers	Purolator
Lube oil cooler	Ross
Lube oil filters	Hilliard
Air filters	American
Exhaust silencersBu	rgess-Manning
Jacket water heat exchangers	Ross
Chain drives	Morse
Pre-lube pump	Roper
Fuel oil filters	Nugent





**APRIL 1961** 

# **AXI-COMPRESSORS GATHER NATURAL GAS**

THREE packaged axial-flow, positive-displacement compressors, installed by the Shell Oil Co. at Little Creek, Miss., are believed to be the first of their type in natural gas field service. The Ingersoll-Rand compressors are driven by Waukesha natural gas engines and deliver gas from long gathering lines in the field to Shell's Little Creek gas processing plant.

When Shell put its new 5 million cu. ft./day processing plant into operation in June 1959, design called for a suction pressure of 20 psig. As the gathering system developed, it was found that the pressure required on the edge well separators, to force gas through long lines to the plant was in excess of separator design pressure and the gas was being pushed out to flare. To reduce suction pressure at the plant would have been an expensive solution, involving another big reciprocating compressor or enlarged main lines. Instead. Shell engineers decided to install three relatively economical booster stations on the problem gathering lines. For this service, they wanted units that would be moderate in initial cost. efficient to keep operating costs down, sturdy enough for low maintenance operation.

Three packaged compressor plants were assembled for the job by Reagan Equipment Co. of New Orleans, incorporating in each an Ingersoll-Rand Axi-compressor driven by a Waukesha natural gas engine through a Twin Disc clutch and V-belt drive. Compressor, engine and auxiliary equipment are skid-mounted for easy installation. There are two size 450X8 compressors rated at 218 cfm

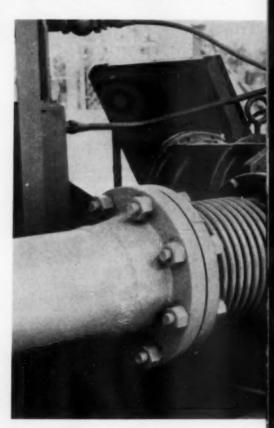
at 3060 rpm and one size 562X9 unit rated at 438 cfm at a speed of 2920 rpm. All are designed for inlet pressure of 25 psia and discharge at 50 psia.

The Axi-compressor is a high-speed helical-type positive-displacement rotary compressor with compact design and relatively high efficiency. The external driver turns a main lobe-type rotor which mates with a gate rotor driven through timing gears from the main rotor shaft. On the intake side, gas flows into the expanding cavity as the rotors open away from each other. The gas then is carried around the outside of the rotors to the discharge side and is compressed smoothly in a diminishing chamber as the rotors mate. This screw action of the helical rotors produces a smooth flow and permits the greater output per pound of compressor.

The 438 cfm compressor driven by a 6-cylinder, 5-1/4x6 in. Waukesha model 145 GKU natural gas engine turning at 1400 rpm to run the compressor through the Twin Disc model SP214PO clutch and V-belts at 2920 rpm. The engine is rated 140 hp at 1500 rpm and capacity provides substantial reserve above the horsepower requirements of the compressor. The skid-mounted packages required little or no foundation. In this case, Shell has bolted them to a light concrete slab and sheltered with a sheet-metal roof. The 562X9 compressor is driven by a model 135GKU Waukesha engine, this one with 41/2x5 in. bore and stroke and rated 90 hp at 1800 rpm.

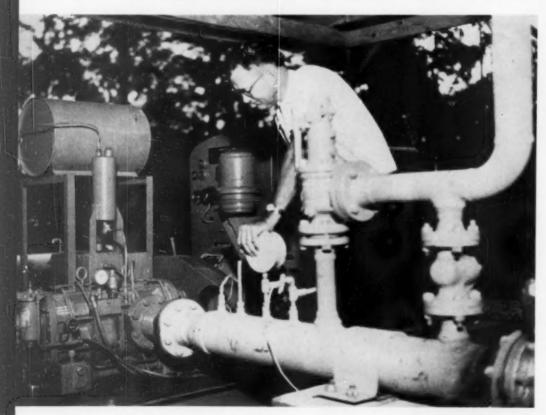
The three engine-compressors went into service

late in July 1960. The larger unit serves the West Lateral with 8000 ft. of 6 in. line gathering gas from 12 wells. Gas passes through a scrubber to the compressor which discharges into a 10 in. line for the last 3400 ft. to the plant. One of the 217 cfm units serves the Northeast Lateral which has four wells sending gas through 5500 ft. of 6 in. line to the booster station which discharges through 800 ft. of 8 in. line to the plant. The other small compressor serves the Northwest Lateral which has a trio of 4 in. and 6 in. lines totaling 5000 ft. carrying gas from seven wells to the booster which in turn discharges into a 6 in.



- Boosting gas from the West Lateral to Shell's Little Creek, Miss. processing plant is this Ingersoll-Rand Axi-compressor. This compact 438 cfm compressor is driven through a Twin-Disc clutch and V-belts by a Waukesha natural gas engine and is rated at 438 cfm at 2920 rpm, compressing gas from an inlet pressure of 25 psia to a discharge of 50 psia.
- Plant Foreman Whaylen inspects one of the 218 cfm (at 3060 rpm) I-R Axi-compressors. The three packaged booster stations are positioned on long low-pressure gathering lines to prevent gas from being pushed out to flare.

Except for the Delta liquid scrubber at right, the engine compressor station is a skid-mounted unit. Mounted over the radiator of the Waukesha engine model 145 GKU is a Power Plus exhaust condenser for automatic radiator water supply.



The Axi-compressors deliver natural gas to Shell's Little Creek, Miss. processing plant which has a capacity of 5 million cu. ft./day and produces gasoline and propane.

line for 3550 ft. then 3400 ft. of 10 in. line to the processing plant.

The engines are started manually at the booster stations, but once in operation the units are quite self-sufficient. The engines have fancooled radiators and makeup water for the cooling systems is provided automatically by small exhaust condensers. Each engine is arranged to shut down if jacket water temperature goes too high or lube oil pressure fails. No lubrication is required in the compression chamber of the Axi-compressor since there is no metal-to-metal contact between the two rotors or between rotors and housing. For

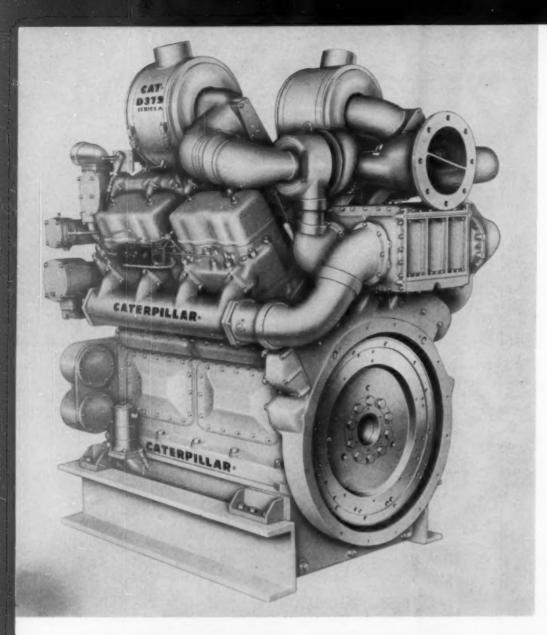


natural gas service, all three compressors have oil-pressurized mechanical seals with rotating carbon faces. Included in each system are a pump, filter, oil cooler, and sump tank. Safety switches shut down the engine if compressor bearing oil or seal oil pressure drops. The stations have a full complement of safety devices. The engines shut down automatically if gas discharge temperature or pressure go too high. In addition, there is a pressure relief valve on the discharge set 5 pounds above the engine shutdown switch. Also, there is an automatic shutdown activated by low suction pressure.

#### **Principal Equipment**

Engines
Compressors Ingersoll-Rand
Starters Delco-Remy
Clutches Twin Disc
Lube oil filters
Safety switches Murphy
Air filtersVortox
V-belts Gates
Gas regulator Fisher
Exhaust condenser Power Plus
Lube level regulator





CATERPILLAR ADDS V-8 AND V-12; MOVES OVER 1000 HP

By ROBERT E. SCHULZ

EORIA, Ill., Industrial Engine Plant—Continuing the rapid expansion of its industrial and marine diesel manufacturing and marketing program, Caterpillar now adds two new V-type diesels to its line—the 445 to 725 hp eight cylinder D379, and the 665 to 1090 hp twelve cylinder D398. These engines, each twin-turbocharged and aftercooled, were designed at the company's industrial engine plant and are now in production. Significantly they move the Cat range over 1000 horsepower for the first time.

Indicative of the pace being set by Caterpillar in its development program is the fact that the D379 and D398 are the sixth and seventh new diesels to be introduced in the last 12 months. They were preceded by the smaller 70 to 255 hp models D320, D380 and D333, the 1673 truck engine and more recent overhead cam D343. The two

new engines follow Cat's engineering pattern of integrally designed turbocharging and aftercooling to achieve efficient performance and horse-power output. Specific fuel consumption of these engines is less than .42 lbs./bhp/hr. at rated load.

The fuel system including pre-combustion chamber and single plunger pump for each cylinder is similar to other engines in the line, however a new governor has been added. There are other similarities, as well as innovations, and we will cover these later as we present in detail the design characteristics and engineering features.

The D379 and D398 are four-cycle diesels with identical 6.25 x 8 in. bore and stroke. Piston displacement per cylinder is 245 cu. ins., and compression ratio is 15.5 to 1. Here is how their ratings line up:

DIESEL AND GAS ENGINE PROGRESS

Flywheel end of the V-8 model D379 Schwitzer turbochargers have 2.7:1 pressure ratio and are arranged so that right hand unit supplies left hand cylinder bank and vice versa. Single aftercooler housing is divided to independently serve each turbocharger.

D398 Turbocharged and Aftercooled

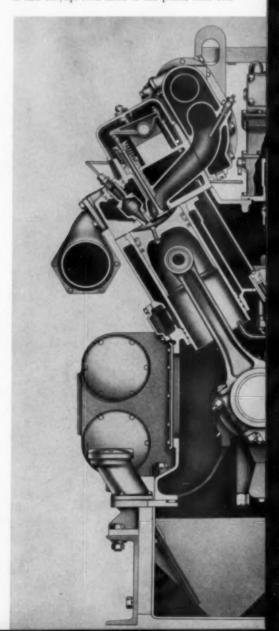
	Industrial		Marine	
	HP	RPM	HP	RPM
Max.	950	1300	1090	1300
Int.	850	1300	975	1300
Cont.	665	1200	765	1200

D379 Turbocharged and Aftercooled

	Industrial		Marine	
	HP	RPM	HP	RPM
Max.	630	1300	725	1300
Int.	565	1300	650	1300
Cont.	445	1200	510	1200

• Raw water cooling of aftercooler

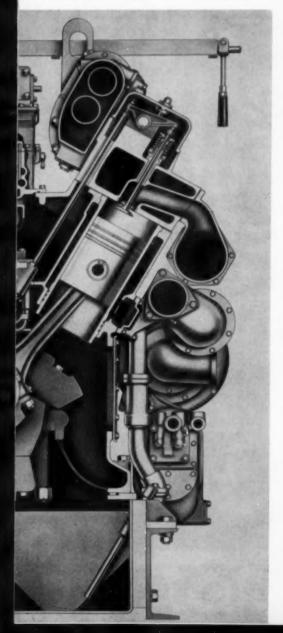
The engines have a good weight to horsepower ratio for prime movers of this size, e.g. the D398 at its maximum rating is 10.6 lbs./hp; the D379 is 12.3 lbs./hp. And more to the point, their cost



per horsepower is substantially lower than the models they replace in the Caterpillar line, namely the D397 and the D375. The higher output of the new D398 engine is graphically illustrated by this comparison with the predecessor D397:

D397	D398
12	12
5.75 x 8"	6.25 x 8"
11,400	11,500
1300	1300
730	950
	12 5.75 x 8" 11,400 1300

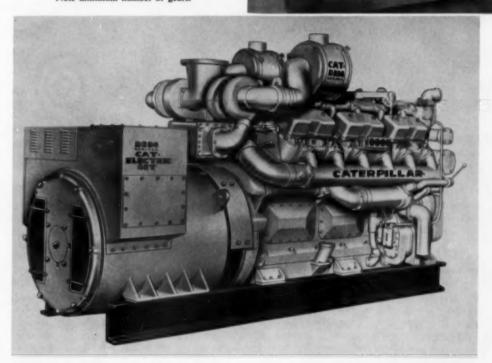
At the plant, I discussed the new diesels with Engine Sales Manager Fred V. Jacobs. "While these engines are new from top to bottom," Jacobs stated, "they are nonetheless of the same bore and stroke (6.25 x 8) as the six cylinder D553 which has been well established in the field since the mid 1950s. The cylinder design has been well proven and additionally we are blessed with the knowledge that 85 per cent of engine's wearing parts are already in the field." Commenting further, Jacobs pointed to expanded areas of application and several new markets that open up for Caterpillar with these higher horsepower Vees. "Generally," Jacobs said, "we can now move into larger power shovels and excavating equipment,



industrial locomotives, batch plants, etc., plus towboats, and other commercial work boats that have previously been out of our range. In the generator set field we now move up to 500 kw continuous, and 600 kw standby with the D398, and 325 kw continuous, 400 kw standby with the D379. Generators with this equipment are the new static-regulated, static-excited type we introduced recently with the D343 engine." Another feature mentioned was the fact that the engines use crankshafts with identical flanged ends so that they can be installed in multiple drive units for applications requiring higher, single shaft power.

> Timing gear cavity between block and flywheel housing has eliminated separate housing on D379 and D398. Note minimum number of gears.





D398 generator set is rated 600 kw standby, 500 kw continuous. Generator is the new static regulated, static excited type. Dry air cleaners are Donaldson.

End cross section of new 61/4" x 8"

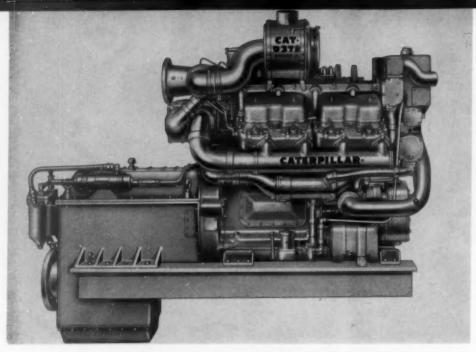
Vee. Cat pre-cup and fuel pump system can be seen. Also note cast-in shelf for pump, governor mounting.

Talking with Design Supervisor Ed Snell, we reviewed the development of the two Vees and the design considerations. Basically Cat was shooting for as small an outline as possible commensurate with the power output, good serviceability from either side, application versatility and counterrotation adaptability. Important too was a design that could utilize the interchangeability of parts offered by the 6.25 x 8 in.—D355 engine.

Cylinder banks on the new engines form a 60° angle with the inlet manifolds on the outside and exhaust manifolds inside the Vee. Flange mounted to the latter are the twin turbochargers so arranged that the left hand turbocharger provides air for the right hand bank of cylinders and vice versa. Pressure ratio of the turbochargers is 2.7:1. The single box-type aftercooler is used on all en-

gines and is mounted on the flywheel housing. It is internally divided to independently serve each turbo and intake air manifold. On the marine versions, the aftercooler is rotated 180° to take advantage of raw water cooling. There is a floating joint with 0-ring seals between the turbochargers and aftercooler. An interesting feature here is that although the turbos are mounted relatively close together, the single exhaust stack is divided to split their flows.

The exhaust manifolds are at the top of the Vee and on the D398 model are divided, each section serving three cylinders. A one-piece manifold is used on the V-8. These units, in addition to their primary function, also double as water manifolds. Taking a look at the cooling system, water from the 400 gpm engine-driven pump goes to the lube oil cooler, and then passes to the upper chamber in the flywheel housing where part of the flow is deflected to the aftercooler. After passing through the aftercooler, this water joins the main stream in the top of the housing and at this point, 100 per cent of the water is available for heat exchangers on torque converter or marine gears. In the absence of such drives, the water makes a



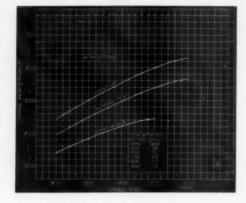
bend and flows back through the lower chamber in the flywheel housing. Here the flow is split, half going to each cylinder bank. From the cylinder block it passes up through the heads into the water passages in the exhaust manifolds, the thermostat housing, and thence to the heat exchanger or radiator. Four Detroit Vernartherms are used which allow 90 per cent of the water to be by-passed even when the water is cold. This assures adequate circulation of water and cooling of torque converters or marine gears while the engine is coming up to heated condition.

On both of the new engines, Cat has gone to an externally mounted oil pump which consists of two, three-gear units. The main pump has a capacity of 100 gpm and the scavenge pumps will deliver a total of 133 gpm. Oil pressure regulating spring is also outside so that pressure adjustments can be made in a matter of minutes. As shown in the cross section, the main oil manifold is located in the bottom of the Vee directly above the camshaft. This manifold is made with telescoping elements, part of which are the valve lifter brackets. Thus servicing of these units is considerably simplified. The lube oil filter consists of a cylindrical tube assembly mounted across the front of the Vee in which four filter elements are stacked end to end. The fuel filter is similarly designed and holds six elements, stacked and spring loaded for end sealing. With this arrangement both filters can be serviced from either side of the engine. Purolator elements designed to Caterpillar's specifications are used in both cans. Carrying this accessibility a few steps further, the engine gauges,

throttle control linkages, and oil filler and dip sticks are also on either side of the engine, and the fuel system can be primed or bled from either side. In addition, the manifold faces on the cylinder heads are milled at a 4° angle to permit removal of the individual heads without disturbing either manifold.

Cylinder construction of the D379 and D398 varies substantially from previous Cat Vees. Walls of the cylinder block have been placed under the studs and have been contoured and sloped to achieve maximum structural strength. A shelf has been created in the Vee on which is mounted the fuel pump, governor and drive, safety shut-off and drive. There are no open ends to the Vee. Wet liners are used and they seat with three seal rings. The alloy aluminum pistons are designed to withstand cylinder pressures of 2000 psi. These low friction pistons take three chrome plated rings, with the two top compression rings riding in an integrally cast iron insert. Constant jet oil cooling of the pistons is employed, hence the connecting rods are not drilled. Cylinder heads are of the two-valve type, with the pre-combustion cup and injector at an angle to the side as shown in the cross section. A large, single hole outward opening type injector is used with a 500 psi opening pressure. Rocker arm covers are aluminum.

The crankshaft, as mentioned previously, has identical flanged ends, each of which is capable of transmitting 2000 hp or approx. the output of two engines. Main bearing journals are 3.00 in. wide and 5.750 in. in dia. Connecting rod journals



D379 industrial horsepower curve.

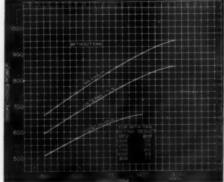


Marine version of the D379 with raw water heat exchanger and Cat 3181 reverse-reduction gear. Oil pump is externally mounted on both engines.

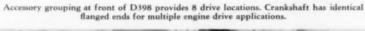
are 4.625 in. wide to accommodate the two rods, and 5.00 in. in dia. Bearings, in both cases, are close tolerance, steel backed aluminum. Both the V-8 and V-12 shafts are balanced and counterweighted, and on the V-8 a gear driven dynamic balancer is used, operating at twice engine speed.

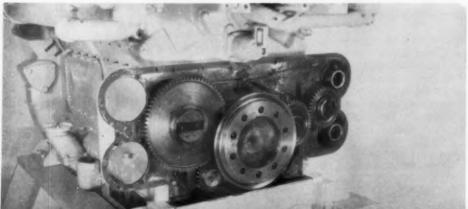
Every effort was made in these engines to keep the number of gears to a minimum, both in the front accessory gear drive and in the timing gear drive at the back of the engine. There is, in fact, no timing gear housing since these gears are located in the cavity between the block and flywheel housing. The front accessory housing provides eight drive locations, four of which are approx. double engine speed, and four approx. 11/2 times engine rpm. The water pump and oil pump permanently occupy two drives, leaving the balance for customer use. Each drive outlet is designed for 50 hp. Should counter rotation of engine be desired, this is accomplished by turning the crankshaft, the camshaft, and fuel pump camshaft end for end. Then in the accessory drive housing, three idler gears are switched (changed from side to side) and the plate at the front of the block is flipped around side for side. Normally work of this type would be done in the Cat plant before delivery, but the simplicity of arrangement is the salient point, as is the fact that it enables Cat to provide full hp off either crankshaft end.

or approx. the output of D398 industrial horsepower curve.



DIESEL AND GAS ENGINE PROGRESS





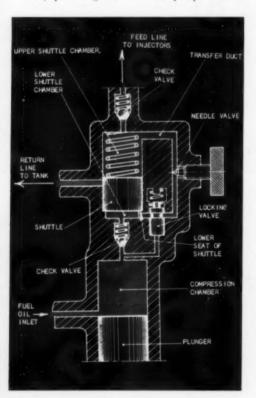
#### NEW FUEL PUMP HAS LIQUID STOP GOVERNOR

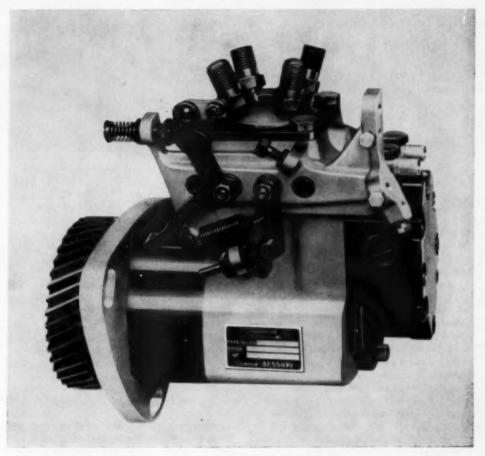
By W. L. BODE

A T the Annual SAE Meeting a new single-plunger distributor pump was introduced to the American market. Built by Precision Mechanique Labinal in Paris, France, the Silto pump, as it is called, was the subject of a technical session at the Detroit meeting with Pierre Bessiere, president and general manager of the French firm, the author.

The Silto pump, as described in the paper, is a self-adjusting unit built for smaller, high speed diesels of two to six cylinders ranging to 5000 rpm. It features a hydraulic "liquid stop" governor which, according to Bessiere, makes the new pump extremely accurate in operation.

During the exhibit hours of the SAE Show, Precision Mechanique Labinal scheduled demonstration rides for all interested parties in a Peugeot touring car. This four passenger sedan was powered with a 50 hp Peugeot diesel equipped with the new Silto fuel pump. In both heavy city traffic and expressway driving, the pump demonstrated its ability to handle fast throttle changes—response was quick and acceleration, smooth. PML is actively producing the new Silto pumps and the





New Silto fuel pump produced by Precision Mechanique Labinal, of Paris. Model shown is equipped with automatic advance between nose mounting flange and fuel distributor pump housing.

first large production order for 2000 units will go to Peugeot for diesel buses.

The new pump is considerably smaller than similar inline pumps manufactured by Precision Mechanique Labinal. The model with automatic advance measures approx.  $7\frac{1}{18}$  in. from mounting flange to the end of the transfer pump, the model without the advance measures approx. 51/2 in. Both are about 65/8 in. high. The pump weighs 14 lbs. with the advance, 11 lbs. without. The pumps can be nose mounted using standardized flanges or cradle mounted depending upon the application and space requirements. Pump speed is 0 to 2500 rpm, maximum input is 15 cu. mm per degree up to 2000 rpm and fuel delivered is automatically calibrated by the "liquid stop."

The liquid stop feature of the Silto pump closely controls engine speed by means of hydraulic pressure operating on a system of plungers and check and locking valves. In the operation of the pump,

Schematic drawing of "liquid stop" governor. Plunger forces fuel out of compression chamber to close locking valve, then through lower check valve to lift shuttle, forcing fuel in upper chamber through valve to injector. Rate of descent of shuttle, thus amount of fuel available for next injection, is controlled by needle valve which restricts fuel flow through transfer duct to upper chamber. Fuel entering through lower check valve on next injection stroke arrests shuttle travel, hence term "liquid stop."

a needle valve which restricts flow of fuel oil controls the return speed of a shuttle piston and thereby controls the amount of fuel available to the injectors. The system, as described by Bessiere, provides close governing of engine speed because the pressure of the fuel oil on the bottom of the shuttle arrests its travel (and gives the liquid stop principle its name) at almost precisely the same point in each pump cycle. Should the engine speed increase, the shuttle piston would travel a lesser distance and, since the travel distance determines the amount of fuel to be injected, the engine would automatically be slowed until the desired speed-fuel equilibrium was once again established.

Pump operation provides extremely rapid cutoff of injection, a factor which helps assure perfect closing of the injector. In addition, the fact the injection always begins at a rigidly fixed point, independent of the delivery rate helps obtain efficient combustion at high speeds and partial loads.

The Silto pump has a built in gear-type transfer pump, which feeds the injection and governor circuits and automatic advance circuit, if the particular model has that feature. The roller bearing mounted camshaft allows direct drive off the engine timing sprocket, when nose mounted. All pump controls are easily accessible. Although the injection timing lag in the Silto pump has been reduced to a minimum so that on some engines the automatic advance can be dispensed with entirely, it is available on request.

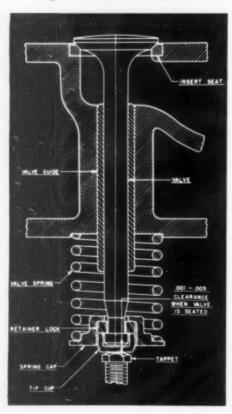
#### VALVE ROTATORS AND SEAT INSERTS

By J. M. CHERRIE\*

N heavy duty engines, rotation is an effective means of extending valve life. Field experience has shown that rotation will increase valve life from two to more than five times, depending on the application. Several years accumulated data ranging from small bore utility engines through over-the-road transportation engines and large bore stationary gas and diesel engines has demonstrated that rotation is beneficial. These advantages are recognized for valve rotation:

- (a) A more uniform valve-run temperature.
- (b) More uniform valve face to seat contact.
- (c) Reduced deposit level on the valve face and seating surface.
- (d) Improved stem lubrication and reduced wear,
- (e) Controlled stem deposition to eliminate sticking.
- \*Manager-product engineering, Valve Division, Thompson Ramo Wooldridge

Fig. 1. Non-Positive Valve Rotator.



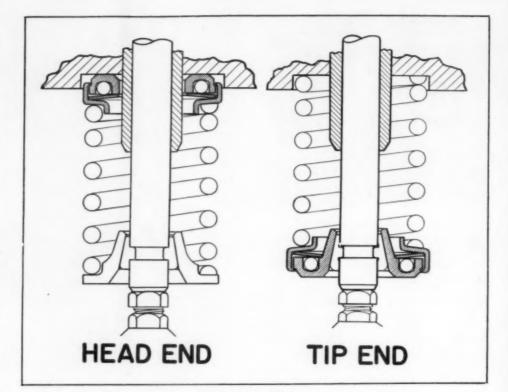


Fig. 2. Rotocap Installation.

The non-symmetrical shape of the exhaust port, supporting the seating surface, subjects the valve to an uneven temperature distribution pattern. With rotation, all parts of the valve head are exposed to the hot spots. This results in less valve head distortion and a more uniform valve face to seat contact.

In a solid valve, more than half of the cooling effort occurs through the seating surface. Limiting the deposit level while maintaining a relatively clean seat contact, improves heat transfer and reduces the maximum valve temperature. Less valve stem lubrication is required with rotation. The lubrication supplied is carried uniformly throughout the guide, resulting in a reduced valve guide and stem wear rate with the wear evenly distributed. Valve stem deposits are minimized and stem sticking largely eliminated. The benefits of rotation were first recognized from reviewing the effect of self-induced auto-rotation on valve life.

After studying the factors leading to rotation, a non-positive Rotovalve design was developed and introduced by Thompson Products in 1938. This design (Figure 1) functioned by momentarily separating the valve from the spring load. Valve motion was then induced by extraneous engine vibration and gas flow past the valve.

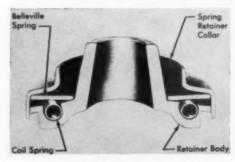
This non-positive rotator type and various modifications proved to be effective and were used in production engines. It had some disadvantages which limited its usefulness. First, in service the tip cup to valve tip clearance required periodic maintenance. Once the clearance was lost, the valve was no longer free to rotate. The most serious objection was that the rotation introduced was non-positive and depended on engine speed, frequency of vibration, clearances, etc. There was

little tendency to rotate at low engine speeds and excessive rotation occurred at high engine speeds.

Recognizing the limitations of Rotovalves and non-positive type systems, a positive type rotator, the Rotocap, was developed and introduced. The Rotocap (Figure 2) is a self-contained positive type valve rotator. It is installed either at the guide end of the valve spring or replaces the conventional spring retainer. Positive rotation occurs as the spring load increases and the valve is opened on the lift cycle. The spring load is transmitted into the rotator through the spring seat, causing a Belleville spring washer to deflect over a series of balls. The balls in turn are forced down an inclined raceway. The reaction ball load on the inclined raceway induces rotation to the spring retainer and through the locks torque is applied to the valve. During each valve lift cycle, a controlled degree of rotation is imparted to the valve. Rotation occurs with the valve off its seat.

Recently another simplified positive type rotator, the Rotocoil, has gone into production usage. This simplified rotator (Figure 3) requires fewer parts than the Rotocap. A close tolerance annular

Fig. 3. Sectioned Rotocoil Assembly.



recess replaces the inclined ball ramps and a single garter spring is used in place of a series of balls and ball return springs. The Rotocoil functions much like the Rotocap with the spring load transmitted through the spring seat, deflecting a Belleville washer over the top of the garter spring. As individual coils are tipped, a small increment of the spring load is shifted in the direction of the spring wind, developing sufficient torque to rotate the body and valve. Once positive rotators are installed no further maintenance is required to control valve lash to insure rotation. Rotation continues, with each valve lift cycle, to the end of the overhaul period. Rotators are normally replaced when a valve failure occurs or at overhaul.

Rotators are considered primarily for use on exhaust valves. In high output diesels, burning low quality fuel, rotation is equally effective on the intake side. Under light load operation, heavy carbonaceous deposits are built up on the underside of the intake valve head and on the stem at the hot end of the guide. Rotation reduces stem deposit build-up and eliminates sticking. Both rotators produce positive type rotation within a design controllable speed range. Figure 4 shows a practical valve vs engine speed range plot for Rotocaps and Rotocoils in a given application. Factors such as Belleville washer height and thickness, ball or garter spring pitch diameter and the ball or garter spring diameter or wire size make speed changes relatively simple.

Greater durability is expected with the Rotocoil. The garter spring increases the number of contact points on the body and the Belleville washer, thus reducing the stress and the wear rate. Positive type valve rotation has gained general acceptance and today more than 160 different production designs are in use. They find application in all types of medium to heavy duty gasoline, diesel and multi-fuel engines.

#### Seat Inserts

In heavy duty engines, valve life may be limited by deterioration of the cylinder head seating surface. A combination of high temperature, deposition, pounding and corrosion make common cast iron integral seats short lived. For these operating conditions pressed-in seat inserts can be utilized to extend the life of the cylinder head. The installation of seat inserts interrupts the normal heat flow path through the valve face into the cylinder head. A significant rise in maximum valve temperature may occur with increases of 100-150° F measured. Higher valve temperatures accelerate creep and corrosion and can create more of a problem than existed originally.

When a seat is required, it must satisfy one or more basic properties not present in the cylinder head material, such as:

- (a) Hot hardness—resistance to mechanical indentation under repetitive cycling at elevated temperature.
- (b) Wear resistance—the ability to resist loss of material, through abrasion, when subjected to high unit loading in the presence of deposition.
- (c) Corrosion resistance—loss of material through chemical attack by the fuel, lubricants or by-products of combustion.

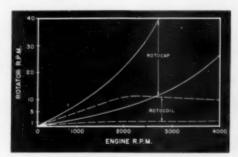


Fig. 4. Positive Rotator Design Speed Ranges.

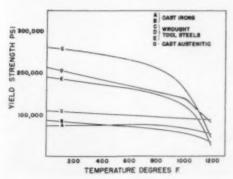
(d) Compatibility—a suitable structure from a bearing standpoint, with increased resistance to incipient surface welding, resulting in less metallic pickup and transfer.

Cylinder head alloys can be satisfactory except lacking one of these properties. In such case, installing a seat insert provides a suitable correction. The installation of seat inserts is no guaranteed cure-all for every cylinder head problem. Conditions such as thermal distortion, localized hot spots and seat cracking are better recognized and eliminated within the head design. A practical seat insert design is essential for satisfactory performance and retention. The predominant type used consists of a short height, thin wall cylindrical section, (Figure 5). In cross section, a height to width ratio of 8 to 5 is desirable. This presents adequate cylindrical surface, in contact with the counterbore, to support a nominal compressive stress level. Where a deeper insert counterbore can be used, the insert and valve temperature is reduced and the unit compressive stress lowered.

A wide range of alloys is available for use in seat inserts. Plain cast irons through nickel and cobalt base austenitics are found. Some alloys were developed specifically for inserts, others were adopted because of their physical properties. Generally, increasing the insert alloy content raises the oxidation and corrosion resistance, the elevated temperature creep strength and lowers the room temperature hardness.

In Figure 6, the hot strength of six diesel and gas engine seat alloys is shown. Alloys A and B are low alloy cast irons applicable in light to moderate duty engines. Alloys C, D and E are wrought, ferritic and originally developed for hot working tool steels. These alloys are useful where increased resistance to creep is required. Their properties have greater significance above 800° F.

Fig. 6. Hot Strength of Insert-Seat Alloys.



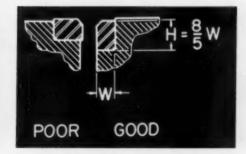


Fig. 5. Recommended Cross Section, Seat Insert.

For heavy duty use, high alloy cast chrome-nickel or chrome-cobalt austenitics are employed. Alloy G is typical of this class. These alloys supply adequate creep, hot hardness and corrosion resistance above 1000° F.

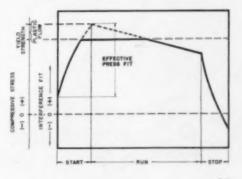
Occasionally inserts are collapsed in service and fall out of the head counterbore. Failures of this type can be prevented by selecting an insert alloy having a higher ratio of compressive yield strength to coefficient of thermal expansion, (Figure 7). Valve seat inserts run several hundred degrees hotter than the surrounding block or head material. When the engine is started, differential expansion occurs and the effective press fit of the insert in the counterbore is increased. As operation continues, if the compressive stress applied exceeds the yield strength, creep occurs in the insert reducing the press fit. When the engine is shut down, the insert cools off and being smaller than the counterbore falls out.

Sometimes the initial press fit is increased in an attempt to prevent insert loosening. A more logical solution is to reduce the press fit or to select an alloy having more appropriate physical properties. A seat insert material selection, based on physical properties, should consider in order:

- (a) Coefficient of expansion (room temperature and operating temperature).
- (b) Elevated temperature creep strength.
- (c) Hot hardness.
- (d) Corrosion resistance.

Many materials appear suitable for use in seat inserts. However, before they are employed complete physical property data should be reviewed. Inserts like other highly stressed engine components are subject to field failure. Careful attention to the material selection, press fit and the installation procedure will minimize these problems.

Fig. 7. Insert Loosening (In Cast Iron).



#### OUR NATION'S DEFENSE DEPENDS ON DIESELS

DIESEL AND GAS ENGINE PROGRESS

#### 149 DIESELS FOR ATLAS ICBM SITES

NE of the largest single orders ever placed with a diesel engine firm was finalized recently when the Corps of Engineers, Kansas City, Mo., purchased 149 White Diesel engine-generator sets for strategic Air Force installations.

This order involves White Superior 40-SX-8's packaged with special General Electric 500 kw generators to furnish prime ground support power for Atlas missile launching sites across the United States.

First part of the order has already been shipped to Vandenberg Air Force Base, Santa Maria, Calif. The generator sets will eventually be shipped to strategic sites on the North American continent.

Atlas ICBM launching sites at most of these bases will take the form of underground "silos," extending 145 feet down into the earth. They are known as "hardened" sites because the shock-resistant concrete and steel construction of the sunken silos will make them difficult to destroy.

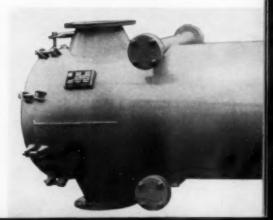
The supercharged 40-SX-8's develop 715 bhp at 720 rpm. These 4-cycle, 8-cylinder engines operate on No. 2 standard diesel fuel and are fully capable of operating on No. 4 diesel fuel.

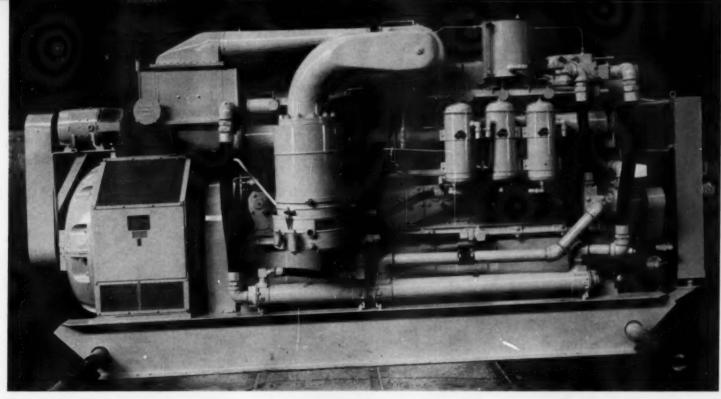
These are highly integrated units that are skidmounted with oil and jacket water coolers, oil bath air filter, jacket water pump, generator exciter, instrument panel, and alarm equipment all in one assembly.

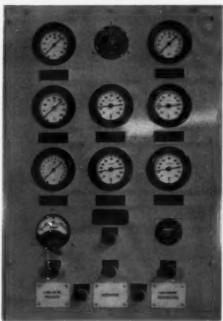
Specifications required that the engine manufacturer certify fuel consumption would not exceed .375 lbs. per horsepower hour for both full and three-quarters load and not exceed .4 lbs. at half load. These low fuel rates were met on tests witnessed by a Corps of Engineers inspector.

Computers and guidance systems need precise power input to maintain accuracy. Considerable development work has been done by White Diesel to perfect this model engine as a precise power

A powerful Atlas intercontinental ballistic missile lifts off its pad in a night launching. Bits of ice and frost formed as a result of liquid oxygen are shaken from the tank by rocket engine vibration.







Control panel for generating unit is installed on front of skid mounted and self contained engine-generator set. Note Alnor pyrometer and Barbour Stockwell tachometer.

Engineering Controls exhaust waste heat recovery silencer of the type used on the White 500 kw generator sets for Atlas missile bases.



White Superior Model 40-SX-8 packaged generating unit which provides prime power for Atlas missile launching sites. Engine drives 500 kw GE generator and is rated 715 hp at 720 rpm. Note Air Maze air filter, Elliott turbocharger, Commercial Fulflo lube oil filters, Yates American heat exchangers, Young intercooler.

Artist's conception of underground "ailo" type launching site. This is typical of the underground facilities for the Atlas that are equipped with two White 500 kw generator sets to supply the power needs of the site. Atlas is stored underground and raised to surface on elevator for launching. Control section is in spherical chamber at right.

unit to meet the rigid requirements for voltage and frequency control.

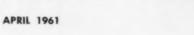
Of the 149 engines now on order, five will end up at Vandenberg AFB, and the other 144 will be divided among other important missile facilities. These power units will be operated deep in the silo. Air intake is from the engine room, and the exhaust, after passing through a waste heat recovery silencer, is piped to the atmosphere.

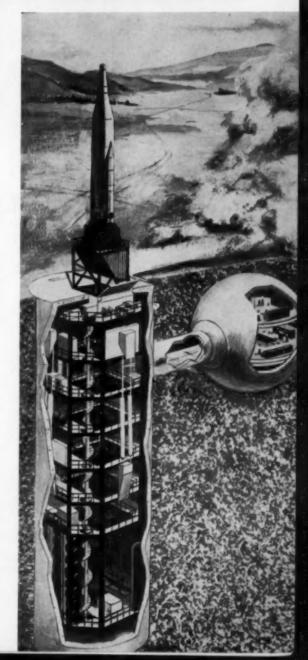
#### List of Accessory Equipment

Engines .....

White

Generators General Electric
Exciters General Electric
Governors Woodward
Turbochargers Elliott
Intercoolers
Lube oil coolers
Fuel Injection pumps American Bosch
Exhaust Heat recovery silencers
Engineering Controls
Air Filters Air-Maze
Lube oil filters CFC Fulflo
Vibration Isolaters Vibration Mountings, Inc.
Exhaust pyrometers
Tachometer Barbour Stockwell





#### SINGLE STAGE AIR CLEANER HAS MOISTURE ELIMINATOR

A NEW single stage dry type air cleaner for light duty applications is now being produced and marketed by the Farr Co., of Los Angeles. The Pamic air cleaner was designed for use on highway trucks and tractors, for off-highway units not subject to heavy dust conditions and for uses such as materials handling equipment.

The new cleaner utilizes the same filter cartridge

as the RotoPamic air cleaner. This paper cartridge has a 330 sq. in. dirt holding surface with low resistance to intake air flow and a conservative rating of 25 cfm per tube.

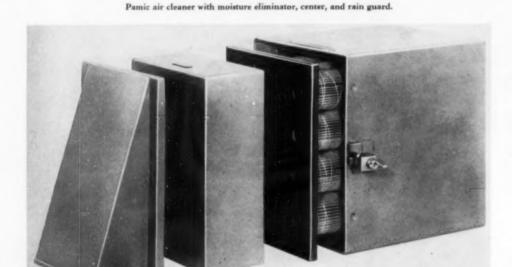
Optional features of the Pamic filter include a new moisture eliminator and a specially designed rain guard. The moisture eliminator separates water from the air flowing into the unit and keeps

MAX. AIR FLOW	RATED* AIR FLOW RANGE-CFM	Pamic KIT NO.	NO. OF FILTER TUBES	DIMENSIONS		PAMIC
				Width	Height	FILTER
50	25-40	L-17501	2	3%	5%	P-2
100	50-80	L-17502	4	6%	614	P-4
150	75-120	L-17503	6	614	8%	P-6
225	100-175	L-17504	9	8%	8%	P-9
300	150-235	L-17505	12	8%	10%	P-12
400	200-315	L-17506	16	10%	10%	P-16
500	250-390	L-17507	20	10%	13%	P-20
600	305-470	L-17508	24	10%	15%	P-24
800	405-625	L-17509	32	10%	20%	P-32
1100	505-785	L-17510	40	13%	20%	P-40
1200	605-940	L-17511	48	15%	2014	P-48
1600	805-1255	L-17512	64	20%	20%	P-64

Data chart for Pamic air cleaner installation. Basic cleaner, including housing and retainer frame is 14 in. long; with optional moisture eliminator and rain guard length varies from 15% in. to 20% in.

intake air dry as it enters the cartridge. The rain guard deflects the direct flow of rain and moisture to keep it out of the cleaner. The Pamic housing of the same heavy gauge welded steel used in the RotoPamic cleaner; all parts of both units are interchangeable, and the Pamic cleaner can be converted to a RotoPamic cleaner for medium and heavy duty services by installation of a pre-cleaner.

Elements are changed by removing the rain guard and moisture eliminator and removing the cartridge. Changeout is from the dirty side of the cleaner, preventing entry of dirt into the engine. The cartridge has its own integral seal which eliminates need for gaskets or other seals. An indicator is factory set to signal when cartridge service is required.



#### DRAGGER HAS C-P WHEEL

RIRST installation in this country of a Seffle controllable pitch propeller was made recently on a 44 ft. Maine dragger. The Swedish-made propeller is driven by a Volvo Penta model MD-67 diesel engine, rated 103 hp at 2400 rpm, driving through Snow-Nabstedt clutch and a reduction gear with 2:1 ratio.

The Pelican is owned by John Gay, South Bristol, Me., and was built in the Harvey F. Gamage Shipyard at South Bristol. The boat is 40 ft. at the waterline, has a beam of 121/2 ft., draft of 41/2 ft. and displaces 17 tons. Cargo capacity is 13 tons.

The Seffle propeller, with 29 in. diameter, is fitted on a 2.36 in. shaft. Pitch in forward or reverse direction is controlled through a mechanical push rod arrangement fitted through the hollow propeller shaft. An O-ring at the propeller shaft end prevents entry of water into the propeller mechanism. The maker also builds propellers controlled hydraulically, in addition to those equipped with the mechanical control.

In addition to driving the propeller, the Volvo Penta engine is also fitted with a Twin Disc power takeoff at the front of the engine. This PTO drives a two drum winch in the cockpit. The six cylinder MD-67 has a bore and stroke of 4.12 x 5.12 in. and displacement of 410 cu. in. Jacket water and lube oil cooling is via sea-water through separate heat exchangers.

Volvo Penta diesel is rated 103 hp at 2400. Winch in cockpit is driven through Twin Disc power takeoff at front of engine.

Pelican is 44 ft. long, is equipped with Seffle controllable pitch propeller.







#### EASTERN FIRM EXPANDS DIESEL SERVICE

CONSISTENT with the trend in the diesel engine industry toward larger, better staffed and equipped service shops is the new facility recently opened by Diesel Injection Sales & Service in Norfolk, Va. Designed and built to provide a complete and highly technical service, the new Norfolk headquarters office and shop is another important step in an expansion program engineered by Diesel Injection's president, Herb Wittersheim. In just 13 years, this company has grown from a small, one shop diesel specialty firm to a complete diesel service organization with a network of five offices throughout Virginia and North Carolina. With the new shop and office building encompassing some 28,000 sq. ft. of floor space, Wittersheim now has one of the most complete and advanced fuel injection services in the country. In addition, incorporated into the new building are facilities and equipment of a subsidiary service to rebuild and repair diesel engines plus separate departments for instrument and electrical repair, and hydraulics service.

The new building provides all equipment necessary to insure proper performance of reconditioned fuel injection systems. This includes air gauges capable of measuring tolerance to 20 millionths of an inch; comparitors for checking parallelism

and external dimensions to millionths of an inch; instruments to determine flatness of lapped surfaces to light band accuracy; test stands for checking action, output and spray patterns of injectors and nozzles; honing machines, flat and rotary lapping machines, and fuel pump and governor test and calibration equipment.

In the newly formed facility for rebuilding diesel engines at the Norfolk headquarters, mechanics have equipment to completely repair and rebuild engines to approved specifications. This includes two Clayton dynamometers, one a 500 hp unit to test out engines, the other a 300 hp chassis dynamometer to test truck installations. Additional machinery includes a piston fitting machine, dynamic balancing machine, Magnaflux equipment, a head surface grinder and a crankshaft grinder. In conjunction with this service, Diesel Injection also maintains a large stock of parts and components for various fuel injection systems plus a

The injection service department of the new facility is typical of the upto-date layout of the new headquarters building and shop.

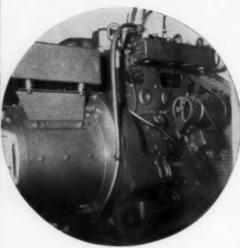
Floor plan of Diesel Injection Sales & Service's new Norfolk main office and shop.

wide variety of engine parts and accessory lines. This inventory of over 30,000 different items is stocked in the main and branch offices and is tabulated and kept current by IBM data processing equipment installed in the new headquarters. In addition to its other operations, Diesel Injection also serves as exclusive U. S. distributor for Hartridge diesel test and service equipment.



APRIL 1961





- The 15 kw Onan generating set powered by a model DD 149 three cylinder four cycle Hercules diesel engine with bore and stroke of 3½ x 4½ in.
  - Lanran is built on the same basic shrimp trawler hull that DESCO mass produced for over 875 fishing vessels the world over. Prototype can be mass produced for about half the cost of a conventional yacht of the same size. The new craft cruises at about 11 knots.

#### LANRAN IS NEW YACHT CLASS PROTOTYPE

By ED DENNIS

RECENTLY had my first look at one of a new class of yachts that might well be an important milestone in the building of big, but inexpensive, yachts. The new vessel is the Lanran, designed and built by Diesel Engine Sales Co., of St. Augustine, Fla., the firm that put the shrimp trawler on a Detroit-like production line basis. The 62 ft. Lanran is the prototype of the new class built on a basic shrimp trawler hull with a change in the sheer line. And it is economical to operate: the

entire running expense of this new type of yacht is about \$2 per hour.

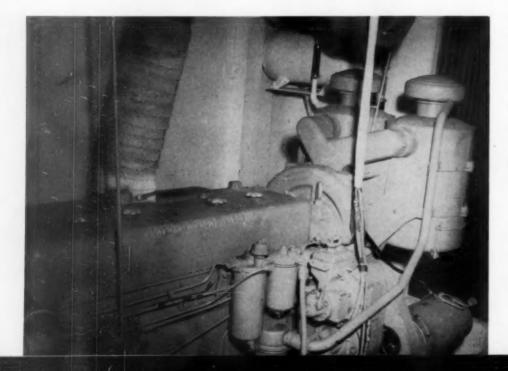
The Lanran is powered by a General Motors 6-110, two cycle, six cylinder diesel engine with a displacement of 660 cu. in. and measuring approximately 79x47x37 in. overall. At 1800 rpm it is rated 220 cont-hp and its approximate dry weight is 4300 lbs. The new vessel is equipped with Allison 4.5:1 hydraulic r&r gears and a 3 in.

bronze propeller shaft which turns a 50x40 in. four blade propeller to give the yacht an average top speed of 11 knots. The main engine also has Donaldson air cleaners, AC fuel filters and lubricating oil filters along with a Perry model 65 cooling system conditioner.

Also in the engine room is an Onan 15 kw generating set powered by a Hercules model DD149 three cylinder, four cycle, 46 hp diesel engine. Other engineering features of the new yacht are two 500 gal. fuel oil tanks plus a fresh water capacity of 1000 gals. carried in three tanks and a 75 lb. Kidde remote control fire extinguisher system.

The Lanran has a cruising range of about 1000 mi. and, as proven by her type of hull, is capable of navigation in almost any kind of weather. Living facilities on board this type vessel offers all the comforts of home plus a few others. There are two double staterooms, a master stateroom and crews quarters, plus three large heads. The galley's all electric equipment includes the range, refrigerator and ice maker plus a stainless steel sink. The 21 ft. salon combines living room and dining room and can be converted to a party room.

The General Motors 6-110 marine diesel engine is rated 220 cont. shp and is equipped with Allison 4.5:1 hydraulic r&r gears. Engine has a total displacement of 660 cu. in. and is equipped with Donaldson air cleaners, AC filters and Perry water conditioner.



DIESEL AND GAS ENGINE PROGRESS

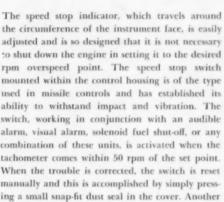
#### 3-IN-1 CONTROLLER HAS SINGLE ENGINE DRIVE

new "Three-In-One" controller incorporating a tachometer, hour-meter and over-speed stop is one of three new Reliance engine accessories just introduced by Barbour Stockwell Instruments. Other additions to the Worcester, Mass. company's line include the series 33 and 75 tachometers. The "33" is a miniaturized version of the Reliance series 50 instrument which is its smaller version with 33% in. diameter case with back drive to meet S.A.F. and military mounting specifications. The series 75 tachometer basically is a re-design with the addition of a nonparallax plateau scale which enables accurate readings from a distance and almost any angle of observation.

With introduction of the new Reliance products, new lower prices have been effected.

According to Newton B. Perkins, sales manager for Barbour Stockwell, the new Reliance series 60 Controller provides engine builders and operators with a combined monitoring device that is simple, yet extremely accurate in operation. Simplicity stems from the unit's overall design in which the tachometer, hour meter and overspeed stop are contained in a single compact housing and all operate from a single drive. This three-in-one feature has been thoroughly proved in a series of proto-type tests in the laboratory and field.

the circumference of the instrument face, is easily adjusted and is so designed that it is not necessary to shut down the engine in setting it to the desired rpm overspeed point. The speed stop switch mounted within the control housing is of the type used in missile controls and has established its ability to withstand impact and vibration. The switch, working in conjunction with an audible alarm, visual alarm, solenoid fuel shut-off, or any combination of these units, is activated when the tachometer comes within 50 rpm of the set point. When the trouble is corrected, the switch is reset manually and this is accomplished by simply pressing a small snap-fit dust seal in the cover. Another





Reliance 3-in-1 Controller incorporate tachometer, hour meter, overspeed stop.



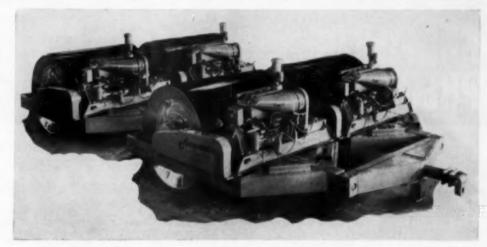
Series 60 Controller, above operator's arm, in test application on engine which powers sightseeing tramway at Wildcat Mountain, Pinkham Notch, N. H.

safety feature Perkins stressed was the fact that the tachometer indicator comes to rest in case of drive shaft failure, warning of malfunction.

The new series 60 Controller is built to the same specifications as other established Reliance tachometers, and incorporates the same flyweight assembly and speed translation mechanism which maintains tachometer accuracy within 1/2 per cent of all points in the speed range. Speed range of the controller is extremely wide (1 to 48,000 rpm) so that scales can be furnished to exactly match the operating requirements.

#### VIBRATING ROLLER USES AIR-COOLED DIESEL

NEW vibrating roller for dirt compacting work, powered by an air cooled diesel engine, has been announced by Shovel Supply Co., of Dallas. The unit has a drum five ft. in diameter and six ft. long and is equipped with a Deutz F4L 712 diesel rated 44 hp at 2200 rpm.



Early models of the Ferguson vibrating roller utilized Deutz A4L 514 engine, newer models have the F4L 712. View shows four units hitched together for compacting work.



The Ferguson model 65 vibrating roller can be operated singly or in arrangements of up to four units as desired. The vibrating feature is produced through a large eccentric shaft, driven by the engine through a Twin Disc power takeoff and V-belts, which revolves at 2300 rpm to pro-

> Deutz F4L 712 cooled diesel is four cylinder unit with continuous rating of 44 hp at 2200 rpm. Note Robert Bosch fuel pump.

duce dynamic impact up to 26,400 lbs. Bearings and moving parts of the roller run in a continous oil bath to minimize lubrication problems. The unit is pulled by a tractor.

The model F4L 712 engine is a four cylinder unit with bore and stroke of 33/4 in. x 43/4 in., for piston displacement of 207.48 cu. in. and with compression ratio of 20.5:1. The engine is equipped with a Robert Bosch fuel injection pump.

AVAILABLE MAY 15th! The completely new 1961 edition of the DIESEL AND GAS ENGINE CATALOG, Volume 26, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 608 page, 10½ x 13½", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover and costs just \$10 postpaid anywhere in the world. Send checks, money orders or company orders to DIESEL AND GAS ENGINE CATALOG, 9110 Sunset Blvd., Los Angeles 46, Calif.

#### **Exide Marketing Aide**

James A. Mustard, Jr., has been promoted to assistant to the vice president-marketing of The Electric Storage Battery Company's new Exide Industrial Marketing Division, national sales and service arm of Exide Industrial Division, and the Nickel-Alkaline Battery Division. Mustard, who was general sales

manager of the Nickel-Alkaline division, becomes responsible for market research, advertising and sales promotion, service engineering and for supervision of such commercial industrial markets as motive power, railway, electric utility and switchgear. He also has over-all responsibility for charging equipment, nickel-iron batteries and nickel-cadmium batteries in industrial markets.

## West Coast News By James Joseph

TO Bear Valley Unified School District, Big Bear, Calif.. its second Crown Coach (school bus) with Cummins NHH-220 (220 hp at 2100 rpm).

SAN Diego State College has taken delivery of a Cummins C175 (175 hp at 2500 rpm) engine for instructional purposes in college's automotive-engineering shops.

Introduced at Southern California's Boat Show:

SHEPHERD Machinery's new 40 hp (at 2000 rpm) diesel marine propulsion unit, comprising a John Deere 1010 engine with watercooled manifold, Paragon reverse & reduction gear.

ALSO previewed: same engine as a diesel electric set, this tabbed Shepherd's Universal Marine ac-dc generator set, delivering 15 kw at 1800 rpm, 150 volts ac and 125 volts dc.

TO Union Oil Co.'s Brea, Calif. research laboratory, a Cummins NHC-4-BI (130 hp at 2000 rpm), for lab-testing of fuels.

FOR United Nations command building, Korea, two Fairbanks-Morse standby generator sets, their F-M 38F51/4 engines (600 hp) driving 400 kw Fairbanks-Morse generators.

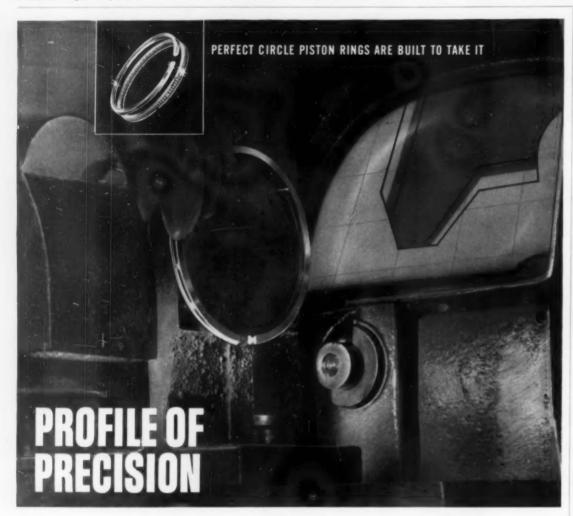
DELIVERED to Babler and Halverson International Inc., Lompoc, Calif., a Le-Tourneau-Westinghouse earth mover with scraper, powered by a Cummins NRTO-6-CI, 335 hp at 2100 rpm, diesel.

FOR the 55 ft. cabin cruiser owned by Faye Stewart, Bohemia Lumber Co. and built at Reedsport, Oregon, a model 262 Allis-Chalmers developing 77 hp at 220 rpm with 15 kw ac generator and 3 kw dc auxiliary. Sale by Hamilton Engine Sales, Inc., Portland.

SMITH'S Diesel Sales, Rialto, Calif., has repowered a GMC truck (owned by Brookside Dairy, Redlands) with a Cummins NT-180 (180 hp at 2100 rpm). Conversion from gasoline to diesel.

DESTINED for the 65 ft. yacht "Carmen Maria," owned by Stanley Spencer and being built by Skallerud & Sons, Wilmington, two Caterpillar D335 turbo diesels, rated 205 hp at 2200 rpm.

INSTALLED: in Dave Halliburton's yacht *Twin Dolphins*, two of the new GM-6V53s, rated 195 hp at 2800 rpm. Sale by Anderson-O'Brien, San Pedro.



You are looking at the profile of a piston ring magnified many times on a powerful comparator. These highly-accurate optical devices are used in the factory to compare finished rings with standard dimensional specifications.

The comparator is but one of the many sensitive instruments employed by Perfect Circle to maintain uniform high quality in all production rings. Such precise control of machine operations assures you of better ring performance.

Whatever the need, Perfect Circles are built to take it. Put your trust in the ring preferred by more engine makers and mechanics than any other—Perfect Circle.





PISTON RINGS · PRECISION CASTINGS · POWER SERVICE PRODUCTS · SPEEDOSTAT
HAGERSTOWN, INDIANA · DON MILLS, ONTARIO, CANADA

#### **Approve Name Change**

Stockholders of Minneapolis-Moline Co., approved a change in the corporation's name to Motec Industries, Inc. at the annual meeting. The name change, Edmund F. Buryan, president, said, was made so that the corporate name would reflect the diversified activities now characteristic of the company. In addition to Minneapolis-Moline farm equipment, other Moline divisions are: Mobilift Materials Handling Equipment; Mo-Power Construction Equipment; Molectronics; Mohawk Foundry & Forge; Moline Automotive: Motec Engineering: Motec International; Mocraft Power Tool: and Pioneer Equipment Finance

#### **New Cat Engine Dealer**

Zagst, Inc., Houston, Tex., will provide sales, parts and service for the full line of Caterpillar diesel and natural gas engines, according to F. V. Jacobs, Cat's Engine Division Sales Manager. The new dealership will pursue all phases of engine markets including petroleum, industrial, marine, construction, public service and trucks. Charles Zagst, president, has 20 years' experience in diesel and natural gas engine applications. Before forming his own company Zagst was Vice-President, Sales, for another large engine dealer. Mr. Jacobs stated that other Caterpillar dealers will continue to sell and service Cat engines as formerly.

#### **SNAME Spring Meeting**

The annual Spring Meeting of The Society of Naval Architects and Marine Engineers will be held April 10 and 11 in San Francisco, Calif. The Northern California Section, one of the twelve regional sections of the Society, will be the host for this occasion, sponsoring the various events on the program. Members will make their headquarters at the Hotel Mark Hopkins. The meeting program is being arranged by a Steering Committee composed of members of the Northern California Section. The chairman of this committee is Robert Tate, vice president, Matson Navigation Co., San Francisco. Two technical sessions are being scheduled during the course of which three papers will be read and discussed by the members.

#### **Exchanger Spec Sheet**

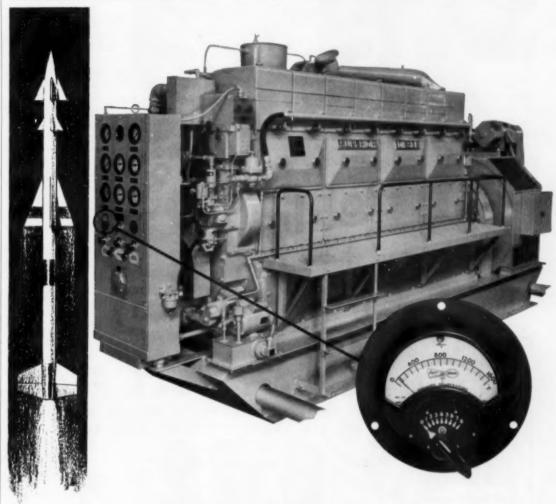
To simplify ordering of air cooled heat exchangers for thousands of industrial concerns throughout the country the Air Cooled Exchanger Manufacturers Association at 53 Park Place, New York City, has completed a new air cooled exchanger specification sheet. The new specification sheet, being distributed to users by ACEMA members, should not only be a valuable aid in ordering, but

also will enable manufacturers to improve deliveries. Its use by consumers will provide information which previously had to be obtained after orders were received. Preparation of the new specification sheet was handled by the ACEMA Technical Committee under the chairmanship of Winthrop D. Comley, engineer of the Yuba-Tulsa Corp., Tulsa Okla.

#### Synchronous Generator Bulletin

A new bulletin describes a line of Electric Machinery Mfg. Co., alternating current generators in ratings from 3.75 through 62.5 kva. These machines are "non-packaged," without voltage regulators. They feature a heavy dripproof frame, easy accessibility, large terminal box, pre-lubricated bearings and end

to end ventilation. Speeds available are 1000 to 1800 rpm. All standard voltages and combinations of standard voltages are available. The machines are suitable for operation at either 60 or 50 cycles. Single or two bearing construction is optional. Copies of bulletin 2100-PRD-250 are available from Electric Machinery Mfg. Co., Minneapolis 13, Minn.



#### alnor PYROMETER

On guard 24 hours a day to assure maximum efficiency in operation and smooth power from this White Diesel generating unit in Atlas ICBM rocket launching sites.

A turn of the knob on the Alnor Pyrometer will give an instant check on the operating efficiency of each cylinder by indicating the individual exhaust temperature.

Improper injection, blow by, stuck rings,

failure of cooling, overload or other malfunctioning of the engine can be immediately detected and corrected before serious damage is done. This is why most diesel power plants today are Alnor equipped.

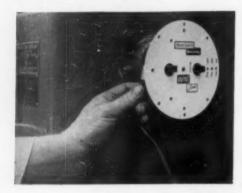


#### ALNOR INSTRUMENT CO.

Division of Illinois Testing Laboratories, Inc.

Room 508 • 420 North La Salle Street • Chicago 10, Illinois

#### **Tachometer Check Device**



A simple means of determining the accuracy of tachometers in service shops can take the place of high intensity stroboscopic light source, and can be used on existing test stands. Developed by Marine Pumps, Inc., producers of Unitest fuel system and governor calibration test stands the Strob-Disc is placed on a standard 70 mm Oldham coupling, or held in place with any standard chuck. A series of holes for checking tachometer speeds at 900, 1800 and 2400 rpms are cut through the Strob-Disc, behind which a shielded neon light is hand held. Operating on the principle of a strobelight, the 60-cycle flicker of the neon light through the holes is brought to a steady "on" or "off" with the variable speed control of the test stand. When the speed of the Strob-Disc has been adjusted to give a steady light source through the appropriate row of holes, the speed of the shaft is either 900,

1800 or 2400 rpm and can be compared with reading of the tachometer being tested. A correction table can then be prepared, or the tachometer removed for overhaul. The Strob-Disc is equally suitable for shop use in testing of marine, automotive or industrial tachometers where the disc can be attached to a test stand and 60-cycle current is available. For more information write Marine Pumps, Inc., 226 N. Marine Ave., Wilmington, Calif.

#### New Anderson-O'Brien Plant

The Anderson-O'Brien Co., Southern California distributors for GM's Detroit Diesel Engine Division held an "Open House" recently to formally open their new plant in the City of Industry, an industrial suburb of Los Angeles. This new facility has over 21,000 sq. ft. under roof and is located on a two-acre site to provide ample parking area for trucks and trailers. The design of the building in its internal layout was based on a conception of the "ideal Engine House" distributorship as envisioned by A. N. Anderson, Vice President and General Manager, with the assistance and suggestions of the Detroit Diesel Engine Division. Included in the design of this plant are many of the most modern concepts of equipment. A Clayton 300 hp chassis dynamometer with bogie rolls has been installed to 'check "before and after" horsepower on engine rebuilds or replacements. A Clayton 700 hp engine dynamometer has been installed in a specially insulated dynamometer room. This dynamometer is capable of checking horsepower on the complete line of engines including the new



V-16, a 16 cylinder version of the series 71 line. A Clayton steam cleaner with dual nozzles having a capacity of 280 and 140 gallons per hour cuts the time of cleaning engines to less than half the former allotment. The engine rebuild area has been put on an assembly line basis with Bacharach engine rebuild stands and sub-assembly benches. Injectors and fuel pumps are rebuilt in an airfiltered room with an observation window from parts department area, with the Kent-Moore "Comparator" within easy view. The generator set assembly and electrical departments have been expanded to keep up with the ever-increasing demand for generator sets of higher kilowatt rating. At the rear of the plant are six 40-foot truck bays under roof, intended to service the ever increasing volume of Detroit Diesel engines. The offices, including a well-equipped engineering department are air-conditioned. In addition to the Detroit Diesel distributorship, the Anderson-O'Brien Co. represents the Electro-Motive Division of General Motors, and the Yanmar diesel engine, a Japanese 3 to 8 hp air cooled diesel. They also distribute Clayton dynamometers and steam cleaners.

# HILCO FULL FLOW FILTERS

FOR MAXIMUM FILTRATION OF DIESEL AND GAS ENGINE LUBRICATING OIL, FUEL OIL AND GAS FUEL...

#### with these features:

- High flow rates
- Low pressure drop
- Choice of filter cartridges
- Large dirt storage area
- ✓ All steel welded construction
   ✓ In-out pressure
- gauges
- ✓ Quick action cover lifter
- ✓ 100 psi standard design pressures

  Higher pressures

  vpen specification
- Swing bolt cover construction



HILCO FILTER CARTRIDGE TYPE FW-718 COMBINATION EXTENDED SURFACE AND DEPTH MICRO FILTRATION



HILCO FILTER CARTRIDGE TYPE PL-718 EXTENDED SURFACE FOR EXTREMELY HIGH FLOW RATES



Smaller

• Write to the PIONEERS of Micro Full-Flow FILTRATION

ing Particles 5 Microns and



#### THE HILLIARD CORPORATION

122 WEST FOURTH STREET ELMIRA, NEW YORK

#### **Koppers Acquires Thomas Coupling**

Acquisition of controlling interest in the Thomas Flexible Coupling Company in January by Koppers Co., Inc., will enable Koppers to provide industry with engineered service backed by three coupling lines, Fast's, Holset and Thomas, according to William B. Sawers, manager of Koppers' coupling department and newly-elected Thomas vice president. The Thomas coupling, manufactured at Warren, Pa., is widely used for reciprocating engines and is strong in such industries as air conditioning, marine propulsion, diesel-electric, cooling towers, pumping stations, and for missile, radar and atomic energy plant applications. The acquisition was the subject of an antitrust suit filed by the U.S. attorney general in Federal District court in Pittsburgh shortly after the Koppers announcement. The government contends the acquisition may lessen competition or tend to create a monopoly in the manufacture and sales of flexible couplings. Koppers officials said that while the Fast's coupling and the Thomas coupling came into being at about the same time, they represented differing concepts in couplings, their development occurred in different market areas and they are complementary rather than competitive because of significant differences in size, design and application. The Thomas coupling utilizes flexible metal discs to compensate for angular or parallel misalignment of drive shafts, as well as free end float. In size, the coupling ranges from the smallest, weighing one-twelfth of an ounce, to the largest, at 20 tons. The Thomas Coupling Co. was organized in 1917 and for a number of years its product was manufactured under contract by other companies. In 1929, the company completed its own plant at Warren and has been engaged exclusively in the manufacture of couplings since. Koppers acquired controlling interest in the Thomas company through an exchange of stock. It will continue the identity of the coupling and will continue its manufacture at the Warren plant.

#### Lubal Insignia



The new insignia for Lubal, Inc., Columbus, O., was designed for product identification as well as to highlight 30 years of progress and improvement in the additive field. With an increasing research and development plan, Lubal compounds blending agents

to meet the ever increasing demands of modern diesel engines. For bulk treatment or individual use, Lubal blends individual additives for diesel fuel and lubricating oil. For further information and a new brochure write Lubal, Inc., 375 W. Rich St., Columbus 22, Ohio.

AVAILABLE MAY 15th! The completely new 1961 edition of the DIESEL AND GAS ENGINE CATALOG, Volume 26, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 608 page,  $10\frac{1}{2} \times 13\frac{1}{2}\frac{17}{2}$ , fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover and costs just \$10 postpaid anywhere in the world. Send checks, money orders or company orders to DIESEL AND GAS ENGINE CATALOG, 9110 Sunset Blvd. Los Angeles 46. Calif.



Atlas Missile as it clears the pad.

Engine exhaust heat, recovered by Vapor Phase® Waste Heat Recovery Silencers on White Diesels, is utilized in the latest design of ICBM sites. Cost of operation is reduced substantially by using this energy in various ways to supplement generated power.

In other applications, engine heat from jacket water and exhaust is recovered for space heating, product heating and with absorption refrigeration for air conditioning.

In addition to these advantages, Vapor Phase systems permit the use of cheaper fuel. Engine wear is reduced and you can lengthen the time between overhouls.

Wherever engines are used, Vapor Phase<sup>a</sup> can improve efficiency and add economy.



White Superior Engine-Generator Model 40-5X-80 used at Atlas Missile Bases.

Vapor Phase Exhaust Waste Heat Recovery Silencer designed for use with the Superior Engine-Generators used by the Air Force at Missile sites.





Sole developers and monufacturers of Vapor Phase Thermal Circulation (Ebulition) Engine Cooling Systems.

ENGINEERING CONTROLS, INC.
611 E. Marceau . St. Louis 11. Mo.

#### **Boeing Division Manager**

Donald J. Euler has been appointed general manager of the Boeing Industrial Products Division. Mr. Euler, formerly director of planning at headquarters will become a vice president of the company. Frank Korsberg, who has been general manager of the division, will become assistant general manager.

marketing, which will permit Korsberg to devote his entire efforts to marketing and servicing the division's products. W. M. Maulden, presently in the Sloan Fellowship Program at Massachusetts Institute of Technology, will become director of planning at Headquarters upon his return about July 1. In the meantime, A. W. Sauerbrey will be acting director of planning.

#### **Inland River Reports**

By A. D. Burroughs

CATERPILLAR power equips the new portable dredge delivered by American Marine and Machinery Co., Nashville, Tenn. The unique dredge, owned by East Coast Dredging Co., Del., carries a Caterpillar D-353 and a D-318C.

AN Ohio ice thaw brought out the Ohio River Co. fleet, including the Mike Creditor, Queen City, Bob Benter, and the Walter C. Beckjord. Each of these towboats perform with horsepower supplied from Baldwin-Lima-Hamilton engines.

TWIN towboats, Western and Eastern, were turning in an impressive performance with a rated 3500 hp each provided by White Company supercharged engines.

THE Andrew P. Calhoun, one of the early 3200 hp towboats, was in Ohio River service for American Lines with power delivered from GM engines. The 160x34 ft. craft was built by Dravo in 1956.

THE new M/V Ned Merrick receives praise from riverfolk as she plys inland rivers for Canal Barge Co., N. Orleans. The rated 3200 hp comes from GM (Cleveland) engines.

FAIRBANKS-Morse OP engines will supply the 2000 bp for each of the seven Navy tugs under construction at Southern Shipbuilding Corp., Slidell, La. The tugs are scheduled for east and west coast port service.

EDDIE Waxler is the name selected for the first retractible pilothouse vessel constructed in Greenville. Built by Greenville Manufacturing and Machine Works, the craft uses the 1800 hp developed by a pair of GM (Cleveland) 12-567-A engines for service from Memphis to the Illinois River, for Waxler Towing Co., Memphis.

THE 57x22 ft. Elgercliff continues to turn in an impressive service record for owner Reserve Transportation Co., Pomeroy, Ohio. The triple-screw craft, built by Humboldt last year, receives a total 510 hp from GM 6-71-E engines.

#### 84 Navajo IH Outfits

Navajo Freight Lines, Inc., transcontinental motor carrier of Denver, Colo. has placed an order with International Harvester for 84 model DCO-405 tractors powered by Detroit Diesel series 71 engines. In announcing the purchase, O. K. Hargraves, Navajo's director of sales said the DCO's will be used largely on the General Expressways operation out of Chicago which is now under Navajo management.

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Design TF7

Design SEC7

TF7 DESIGN—Pedrick Conformable Taper-Face Compression Ring. Taper face provides a line contact with the cylinder wall for quicker seating and sealing, less chance of scuffing. Used in combination with the exclusive "Equalizer" in certain grooves of Pedrick Engineered Installations according to engine conditions and operating requirements.

SEC7 DESIGN—Pedrick Conformable Seal-Cut Compression Ring. Consists of a single-piece castiron section of considerably less radial thickness than non-conformable conventional rings, plus the exclusive "Equalizer". Most effective in sealing not only between ring and cylinder wall but at the gap because of special design overlapping ends. Used most commonly in the lowest compression groove.

# PEDRICK COMPRESSION RINGS GIVE...

MORE POWER . . . LONGER LIFE . . . HIGHER EFFICIENCY

By the time combustion gases reach lower compression rings, there is often insufficient pressure available to force the cast iron rings out against the cylinder wall. This may result in an unsatisfactory seal. Pedrick solved this problem by introducing the specially designed "Equalizer". This steel expander exerts a uniform outward pressure against the cast-iron ring, and assures a positive seal between ring and cylinder wall.

In addition, the special 2-piece construction makes it possible to reduce the radial thickness of the ring. Accordingly it is more flexible and therefore more conformable.

It is the combination of this conformability and the pressure exerting "Equalizer" that assures you effective sealing, freedom from blow-by and full power at all times.

You can put Pedrick's extensive experience in the design and application of conformable compression and oil rings to work for you in solving your particular ring problem by contacting our Engineering and Consulting service. We'll be glad to hear from you. Write or phone: WILKENING MANUFACTURING Co., Philadelphia 42, Pa. In Canada: Wilkening Manufacturing Co. (Canada) Ltd., Toronto 2.



PEDRICK PIONEERED Conformable RINGS FOR BIG-BORE ENGINES

#### Sound Purpose Attached To SAE Marine Subcommittee Program

In a well defined move to serve all segments of the marine industry concerned with operation and maintenance of tugs, towboats and other diesel vessels, the SAE Powerplant Activity has established a new marine propulsion subcommittee. This subcommittee, headed by R. A. Pejeau of the Cleveland Diesel Division of General Motors, will hold its first session at the SAE Summer Meeting scheduled in St. Louis at the Chase-Park Plaza Hotel, June 5-9.

The Marine Propulsion Subcommittee has moved quickly so that a full day of the Summer Meeting can be devoted to subjects of interest to all engineers, builders and operators. Papers scheduled thus far include: Postwar Diesel Installations in the U. S. Navy; Marine Engine Applications in Mississippi River Towboats; and Bow Thrusters and Their Application to Maneuvering River Boats.

This subcommittee program was started during the SAE Annual Meeting held recently in Detroit. Powerplant committee members felt that such a program could not only create better and closer association of vessel builders and operators, but would place at their disposal a definite means of promoting studies in their common interest towards effecting more economical operation. It also provides an excellent way of bringing to the marine industry complete information on new equipment and application techniques. Participation by the marine industry is urged and further information on the St. Louis meeting can be obtained by writing to: Society of Automotive Engineers, 485 Lexington Ave., New York 17, N.Y.

#### Lufkin Gear Bulletin

A new bulletin describes the gears for various applications manufactured by the Lufkin Foundry and Machine Co. The 12 page illustrated publication describes the gears produced for applications in pumping, dredging, marine drive and many other uses and also shows some of the modern machine tools and facilities used by the firm. For a copy of General Information Bulletin No. 9, write Lufkin Machine and Foundry Co., Lufkin, Tex. (ITS NEW)

#### Installation, Test Code

The Society of Naval Architects and Marine Engineers has announced publication of A Code on Installation and Shop Tests, listing agreed minimum shop and installation tests for the use of ship designers, shipbuilders and ship owners. This new code is the result of studies by the M-10 Panel of the Society's Technical and Research Committees. In addition to representing a major improvement which can be realized in the standard specifications of test procedures, this new code has eliminated many useless and expensive carry-overs of past practices. Mr. John G. Earle, of Nordberg Manufacturing Co., chairman of the panel, stated that "widespread

use of this code can result in the saving of many thousands of dollars to the marine industry in the next few years." Copies of the code may be obtained at a price of \$2.00 each at Society Head-quarters, 74 Trinity Place, New York 6, N. Y. A list of all available technical bulletins and publications, together with their cost, is available upon application to the secretary of the Society.

#### **Gear Division Manager**

Robert C. Jacobs, formerly assistant general manager of the Automotive Gear division of Eaton Manufacturing Co., has been promoted to general manager. He succeeds G. Willard Frame who has served Automotive Gear in an executive capacity for the past 36 years, who retired.



# PaH

# "FIRST IN ALUMINUM ...MOST IN ALUMINUM"

Here is how P&H can offer you the lightest, most compact diesel engine available. Crankcase, housings, covers, pans, manifolds, bearings, even the push rods are made of light weight aluminum alloy, saving you up to a half ton over engines of outdated cast iron construction. In some cases, this weight saving alone can amortize the entire cost of a P&H diesel in one year. No other engine can give you time tested and proved aluminum construction.

Serviceability is also unmatched with P&H diesels. Consider the cost savings these features:

- \* 25% fewer parts
- \* 80% interchangeability of parts
- One size bore and stroke on all engine models
- Simplest fuel system available (one adjustment times the entire engine)
- \* "Unitized Power Assemblies"

After thousands of running hours, you can easily remove a complete "Unitized Power Assembly" (head, liner, piston, rod and water jacket)—and replace it with a new one—in less than an hour. No need to even drop the pan, detach manifolds or disturb engine mounts.

manifolds or disturb engine mounts.

Specify modern P&H Diesel power on your new equipment. For more information, contact your P&H dealer or write for bulletin Z-42.



PaH Model 487H-18 AT rated 220 Hp at 1800 RPM, weighing only 1500 lbs. or 6.82 lbs. per B.H.P. Available in 3, 4 and 6 cyl. models to meet all your trucking needs.

HARNISCHFEGER

Crystal Lake, Illinois



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#### **Air Impact Wrench**

Albertson & Company, Inc. has announced a new heavy duty, 1 in. square drive #482 air impact wrench. An improved air motor and housing is coupled with an impact mechanism of advanced design. Air entry is through a ½ in. inlet. The reversing valve with related volume control for right hand op-

eration is leakproof and well protected. Bails provide for horizontal or vertical suspension. An auxiliary, adjustable handle can be moved to four positions. The Sioux #482 is designed for heavy duty applications requiring the high speed, high torque, fast run down, and maximum stamina. For more information write Albertson & Company, Inc., Sioux City 2, Iowa.

#### F-M Dorman Conclude Marketing Agreement

Fairbanks, Morse & Co. will begin immediate expansion of its diesel engine line through an international marketing agreement with W. H. Dorman & Co., Ltd., of Stafford, England, it was announced by David Karr, president of Fairbanks Whitney, F-M's parent company. Attending a joint press conference in London with executives of the Dorman Co., Karr said the agreement is for a 20 year period and will enable Fairbanks Morse to introduce a new range of small, high speed diesel engines in the United States. Dorman diesel engines are already widely used in North America for a variety of purposes including generator driving throughout the mid-Canada radar defense line and the micro-wave telecommunication links in both eastern and western Canada, the latter being the longest unattended radio telecommunications link in the world. Included in the agreement were:

The Dorman L series—Power range of from 20 to 250 hp at 800-2200 rpm. Units have two, three, four, five, six and eight cylinders, with four- and six-cylinder sizes also available as turbocharged units.

The Dorman Q series—Power range of from 117 to nearly 700 hp at 800-1800 rpm. Units have six, eight and 12 cylinders, with eight- and 12-cylinder units in V arrangements, all available as naturally aspirated or turbocharged engines.

The agreement provides for the future possibility of reciprocal manufacturing rights. At a later date, Dorman may undertake the manufacture in Britain of some Fairbanks-Morse diesels. Dorman engines may also be manufactured under license in the United States by Fairbanks, Morse. It is planned that Dorman will ship stripped basic engines, with fuel injection equipment, to the United States after full bench test. Workers at the Beloit, Wis. plant of Fairbanks. Morse will fit them with American-made filters, electrical equipment, piping, clutches and general hardware. The two companies will exchange teams of specialists from the Beloit and Stafford plants to resolve mutual production techniques.

#### **Chief Engineer**

Dick Hodge has been appointed chief engineer, Diesel Engine Division, Preston, of the English Electric Company Ltd. Mr. Hodge, who had been chief designer of the Diesel Engine Division at Brownsover Hall, Rugby, will be responsible for all diesel engineering activities at Preston and the Vulcan works.

# ENGINEERING NEWS YOU CAN USE ABOUT ENGINE AND COMPRESSOR PERFORMANCE

CAN YOU PICK THE RINGS WITH 37,000 HOURS' WEAR?

Take a close look at this engine piston that's just been pulled for routine inspection at the generating plant of Illinois Rural Electric Co. Then see if you can pick the rings with 37,000 hours of wear.

No matter which ones you picked, you're right! The complete set of Cook rings has completed 37,000 hours of operation. But you wouldn't know it.

What's the reason for the unusual wearing qualities of this set? Special, expensive *top* rings? No, they're standard Cook sealing rings. The reason is to be found in grooves number 4 and 5—COOKTITE sealing rings. Cooktite rings completely seal the ring gap, ring groove, and cylinder wall, and greatly reduce the excessive load normally carried by ring number 1.

Maybe Cooktite is the solution to your ring problem.

#### HAVING TOP RING TROUBLE?

If you have had trouble with your top piston rings (excessive groove wear, groove damage, ring breakage, etc.) you won't need to be convinced that the top ring carries from 50 to 80% of the sealing load. The solution that is saving dollars for many companies is the installation of a Cooktite sealing ring, or rings, in the lower grooves.

In an engine with a compression pressure of 500 psi and a firing pressure of 1,000 psi, a Cooktite ring will reduce the pressure differential on the top ring from a trouble-causing 750 psi to an easily-handled 500 psi. Ask a Cook representative to show you where Cooktite rings can work for you.



#### SEND FOR FREE 8-PAGE BOOKLET

UNRETOUCHED

Improve your engine's performance and keep it high for longer periods by better cylinder sealing. You can get a free copy of this informative technical study by writing C. Lee Cook Division, Dover Corporation, 940 South 8th St., Louisville 3, Kentucky.





#### **Mack Sales Manager**

Appointment of Albert G. Crockett as general sales manager for Mack Trucks, Inc., was announced by C. A. Johnson, chairman. Mr. Crockett was formerly director of sales development for Mack. Assisting him in his new post will be Wallace Hallam, who will move from Atlantic Division manager in Philadelphia to the newly-created post of manager of field operations. E. H. Dillow, former Detroit district manager will team with Hallam as assistant manager of field operations. Mr. Crockett succeeds Theo. H. Jones, who has been assigned to the Company's Atlanta office as Southern Division manager. His postwar activity as director and lecturer for Mack's national diesel caravan, followed by his supervision of the company's diesel training course, gained Crockett industry-wide recognition as a pioneer in the development of the automotive diesel market in this country.

#### 1-Millionth Series 53 HP

Production of series 53 diesel engines introduced by the Detroit Diesel Engine Division of General Motors in 1959 reached the one million cumulative horsepower mark in January, Robert E. Hunter, general sales manager announced. The diesels, ranging from 24 to 195 hp, were added to the Division's line to meet power requirements of light- and medium-duty trucks, light industrial and construction equipment, small pleasure craft and work boats. According to Hunter January production also boosted Detroit Diesel's overall output of engines including Series 71 and 110 models to over 88 million horsepower. The overall horsepower figures date from 1938 when the Division was established.

#### Perfex Promotion

Perfex Corp. Milwaukee, has announced promotion of George P. Karas to assistant manager, Perfex Pak Division. Mr. Karas, an engineering graduate of Marquette University joined the Perfex organization in 1959 as a Sales Engineer.

#### **Charger-Battery Combination**

A new charger-battery combination to provide standby engine starting is now in production by C & D Batteries, Div. The Electric Autolite Co. The combination consists of a Slyver-Clad battery with lead calcium plates and an Auto-Reg silicon rectifier charger designed as a companion to the battery. The combination produces instantaneous starting current for standby diesel engines. The lead calcium alloy used in the battery grids greatly increases battery life expectancy because it is subject to much

less internal corrosion than conventional lead-antimony grids. The C & D AutoReg charger provides a constant dc output over an ac line input variation as high as ± 15%. Heart of the charger is a hermetically sealed silicon rectifier with no known aging characteristics. There are no aging taps and no relays to adjust. Trained personnel are not required for operation. Low water-

ing requirements of the lead calcium battery and the minimum maintenance requirements of the charger make the combination ideal for use in remote locations. Complete details on the combination are in bulletin AR-104. A copy may be obtained by writing the advertising department, C & D Batteries, Div. The Electric Autolite Co., Conshohocken, Pa.

#### F-M President Aide

Appointment of LeRoy W. Fitzgerald as assistant to the president of Fairbanks, Morse & Co. was announced by Thomas G. Lanphier, Jr., president. Fitzgerald formerly was manager of special activities, corporate general office, public relations, of the Convair Division of General Dynamics Co., San Diego.



STANDARD & OPTIONAL EQUIPMENT ON LEADING TRUCK, TRACTOR & STATIONARY ENGINES

MODELS 78, 135-S, 200-S—single-bolt lid, screw-in type pack, overall compact design. Provide ultimate in filtration for passenger cars, small trucks, tractors—other similar engines up to 5-quart, 6-quart, and 7-quart crankcase capacities.

MODELS 272-C AND 363-C—single-bolt lid clamp, O-Ring lid gasket, screw-in type pack, rugged construction throughout. For heavy-duty service on gas, gasoline or diesel engines up to 3-gallon and 4-gallon crankcase capacities.

MODELS 500-C AND 750-C—single-bolt lid clamp O-Ring lid gasket, large-capacity packs, extra rugged construction for most severe service. For use on gas, gasoline or diesel engines up to S-gallon and 8-gallon crankcase

capacities. Also on fuel lines, hydraulic oil systems, and other industrial applications.

MODELS 750-2C AND 750-3C — single bolt lid clamp, O-Ring lid gasket, multiple packs for extra large capacity. Either wall or floor mounts for industrial use on engines up to 35-gallon sump, fuel lines to 15 GPM, hydraulic oil systems to 450 gals. For larger capacities, two or more Units can be connected in parallel.

MODELS F-120-C AND F-155-C—for gasoline and diesel fuel lines on mobile, stationary, or marine applications. Extremely efficient in removing impurities and contaminants from fuel. Single Units handle flow rates from 1.0 to 2.0 GPM on suction or gravity flow. For larger capacities, two or more Units may be connected in parallel.



AVAILABLE THROUGHOUT THE WORLD

#### GENUINE LABOR REPLACEMENT PACKS

**DIESELPAK**® For use on H.D. compounded oils for diesel and gasoline engines. Removes finely dispersed contaminants without affecting additives.

- IMPERIAL model for extended maintenance schedules (7,000 to 12,000 miles between oil and pack changes).
   Most economical.
- REGULAR model for frequent oil and pack change schedules (4,000 miles to 7,000 miles). Low initial cost.

LUBER-FINER, INC., 2514 So. Grand Avenue, Los Angeles 7, California



REFINING PACK

For use on straight mineral oil, synthetic oils diesel fuel oil, hydraulic fluid, etc.

#### Michigan-Ohio News

By Jim Brown

HARNISCHFEGER Corporation has announced the appointment of Eddy & Company's Branch office in Farmington, Mich. as their dealer for the P&H line.

CITY of Lansing has purchased a model



#### to REDUCE maintenance, operating costs and extend engine life

- . STOPS CARBON BUILD-UP
- . STOPS STICKING VALVES
- . STOPS RING WEAR
- . STOPS CORROSION
- STOPS SLUDGE AND VARNISH

LUBAL BLENDING AGENTS used in diesel fuel, gasoline and lubricating oil will minimize down time and excessive overhauls. They are specifically compounded to eliminate the causes of pre-ignition, remove carbon abrasives in the fire zone area, and thoroughly lubricate the critical upper cylinder area. Use LUBAL for bulk treatment or for individual engines.

#### MONEY BACK GUARANTEE

USE LUBAL FOR 3 MOS.

Convince yourself . . . LUBAL will improve and increase gasoline and diesel engine performance . . . or your money back. Write for full details and OUR NEW BROCHURE.



75 Pettibone-Haiss loader powered by a Hercules diesel engine. The new loader will be used for handling stone and gravel and was purchased from Cyril J. Burke, Inc. of Detroit.

EARLE Equipment Co. of Detroit reports sale of an HD11 Allis-Chalmers crawler equipped with a side boom and hydraulic dozer. The unit was sold to Consumers Power Co. of Williamston, Mich.

A Huber-Warco model 11 D road grader equipped with a Cummins H-6-BI diesel was purchased by the Iosco County Road Commission from Miller Equipment Co. of Livonia, Mich.

P. J. Brady Company of Detroit has a new Jaeger model 600 compressor. It is powered by a GM 6-71 diesel engine and is used to drive a Thor TR-5 wagon drill for excavating and utility work. Distributor of Jaeger equipment is Cyril J. Burke Inc.

UNITED Trucking Co. of Detroit has recently purchased seven Cummins model C-160-B "stop-and-go" diesel engines for their IHC model DCO205 and White 3000TD tractors. The Cummins C-160-B is rated at 160 hp at 2500 rpm. Local Cummins distributor is Cummins Diesel Michigan Inc. of Dearborn, Mich.

WOLVERINE Tractor and Equipment Co. of Detroit and Grand Rapids has announced the sale of an International TD-9 crawler-tractor to Woolf Excavating Co. of Kalamazoo, Mich.

NORTHWEST 30 ton erection crane (model 41) powered by a Caterpillar model D318 diesel engine was recently sold to Darin & Armstrong of Detroit. The new crane has an 80 ft. boom, 20 ft. jib, special erection crane crawlers and will be used in the construction of bridges and overpasses on Detroit's expressways. Sale was made by Cyril J. Burke Inc.

CUMMINS Diesel Michigan Inc. of Dearborn, recently repowered an International Model LFD 302 tractor with a Cummins NHS-6-B (290 hp). The installation was done for Joseph Stefanski of Rochester, Michigan.

NEWLY established firm, Construction Machinery Supply Co., Wausau, Wis., has been named distributor in the Upper Peninsula of Michigan for the Allis-Chalmers line of construction equipment. Branch offices of the firm are being established at Wakefield and Newberry, Mich.

NORTHWEST 30-ton erection crane powered by a Caterpillar model 359 diesel engine was recently delivered to Ken Marks of Port Huron, Michigan. The new crane will be used for building bridges and was sold by Cyril J. Burke, Inc.

PRESQUE Isle County Road Commission of Rogers City, Mich. has accepted delivery on an International TD-9 crawler-tractor. Sale was made by Wolverine Tractor and Equipment Co.

MILLER Equipment Co. of Livonia, Mich. recently sold a Huber-Warco road grader (model 10D) powered by a GM 4-71 diesel engine to Gladwin County Road Commission.

SHIAWASSEE County Road Commission of Corunna, Mich. has accepted delivery on an Allis-Chalmers HD11B crawler with hydraulic 'dozer. Sale was made by Earle Equipment Co.

HILLIARD Drilling Co. of Skeels, Mich has ordered two Cummins NHS-6-I diesel engines with Fuller 4-BI-86 transmissions and Lipe 15 in. single plate clutches. The new engines will be used to power a Franks Drilling Rig and were purchased from Cummins Diesel Michigan Inc.

GIANNETTI Brothers of Detroit have a new Northwest model 6 pullshovel (1¾-yd.). The unit is powered by a Murphy model 20 diesel and was sold by Cyril J. Burke, Inc.

EXPANDED parts office facilities and a new 2,700 sq. ft. balcony for parts storage are in use at the main office of the Michigan Tractor & Machinery Co. of Detroit. The expansion was made necessary by addition of new Caterpillar products, according to Bob Hight, general parts manager.

MILLER Equipment Co. reports sale of a Huber-Warco road grader (model 10-D) with a GM 4-71 diesel to Livingston County Road Commission.

CUMMINS Diesel Michigan Inc. has installed a 290 hp model NHS-6-CI in a Michigan Model 280 dozer for Miller Equipment Co. of Livonia.

#### Controller Catalog

A 56 page catalog covers complete line of Electronik controllers—pneumatic and electric—by Minneapolis-Honeywell Industrial Division. This detailed, illustrated catalog covers new modular design features as well as the new proportional plus reset plus rate control units, partial chart listings, and pneumatic and electric contact control forms. For more information, write for Catalog C-15-2a to Minneapolis Honeywell, Industrial Division, Wayne and Windrum Aves., Philadelphia 44, Pa. (TS NEW)

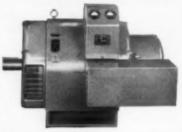
#### **Parts Sales Supervisor**

Clark Bros. Co. has announced appointment of A. J. Foster as parts salesman and service supervisor for the Dallas-Midland District. Mr. Foster's new head-quarters will be located in Albuquerque, New Mexico where he will supervise spare parts sales to the oil, gas and petrochemical industries.

#### Get the latest!

A COMPLETELY NEW "PACKAGED" GENERATOR

#### AMP-PAK



AMP-PAK Generator shown is rated at 187 kva, 1200 rpm, 240/480 volts. AMP-PAK is available in ratings of 75 thru 187 kva at 1800 rpm and 62½ thru 187 kva at 1200 rpm. Three phase, 80% PF, 60 cycles, 50C rise, and 120/208, 240 and 480 volts.

#### No exciter... No moving parts in the voltage regulator

AMP-PAK is a compact, revolving field a-c generator with built-in, static excitation system; static voltage regulator; and basic metering and controls conveniently grouped. AMP-PAK is a portable unit, factory assembled, internally connected, and tested.

No rotating exciter to maintain. D-C excitation is provided by a heavy duty, long-life, static rectifier.

No tubes, relays, vibrators to service. Voltage is regulated by a static, E-M-developed sensing circuit and "magical" magnetic amplifiers.

Holds voltage "rock-steady" so your motors, lights, and electronic equipment will work better. The static regulator provides ±2% regulation.

Starts big motors. A special, built-in voltage booster transformer stands by to reinforce line voltage when heavy loads are suddenly applied.

Easy to install. Needs no switchboard. Just connect load to AMP-PAK thru a suitable line switch.

Simple to operate. Has no belts, no "tricky" commutator, no adjustments – anyone can operate AMP-PAK.

See your nearest E-M Sales Engineer and write the factory for publication PRD-236.



ELECTRIC MACHINERY MFG. COMPANY Minneapolis 13, Minnesota

Largest manufacturer of "Packaged" Generators

#### Florida Diesel News

#### By Ed Dennis

SEMINOLE Tribe of Florida, Inc., received a General Motors 6-71 diesel engine, 142 hp at 1800 rpm, to power a 36 in. Couch turbine pump currently being used for irrigation purposes on the Brighton Seminole Indian Reservation, from Miami Branch Detroit Diesel Div.

BELCHER Towing Co. of Miami will take delivery of the 86 ft. Admiral Leffler, a towboat powered with a 1000 hp Enterprise marine diesel plus two 30 kw Cummins dieselized generating units.

CUMMINS diesels, model NVH-12, rated 307 cont. hp at 1800 rpm or 450 hp at 2100 rpm, with Clark torque converters, power the three No. 1201 Lima 31/4 vd. draglines at Ideal Crush Stone. west of Medley.

CATERPILLAR powered model D353-C, with Cotta transmission and Falk 16 F couplings in the 32 x 10 ft. Dixie dredge recently delivered to Cemento-Atlantico S. A. of Panama. A Cat D318-G supplies power for hydraulic system.

UP at Delray Beach, Dick Crocco, was working three Allis Chalmers TS-160 motor scrapers powered with AC supercharged diesels rated 155 hp at 2200 rpm. Also being used on the same land clearing job was an Allis Chalmers HD-16 dozer for pushing loading and a model 145 AC motor grader.

A 15 kw Onan generating unit powered by a model DD 149 Hercules four cycle, three cylinder, 46 hp diesel engine was installed in the Swiftwind, Jacksonville.

AT Dade Drydock, the 60 ft. personnel and utility craft powered with a pair of Cleveland Diesel model 8-268 marine engines developing 500 hp each.

NEAR New Port Richey, at Flor a Mar development, a Manitowoc model 4500 dragline with a 5 vd. bucket and 140 ft. boom, powered with a 500 hp 12 cyl. D397 Caterpillar diesel engine.

MERCEDES-Benz diesels of the 1500 hp class were in the 16 in. dredges that Service Machinery Corp. of Hallandale shipped to the Persian Gulf and North Africa.

FLORIDA Georgia Tractor Co. of Miami, delivered to C. T. Stockton, two model 160 Galion road rollers powered with Cummins 160 hp model H-6 diesel engines; and a similar model went to Brantsfield & White, Inc. of Ojus.

DIESEL Shipbuilding of Jacksonville launched the 32 ft. push boat, Judo, for

Modena Plantation of Isle of Hope, Savannah, Ga. The model ME-4 Murphy diesel will deliver 85 hp at 600 rpm through Twin Disc 2:1 reduction gears to a 34 in. Ellis four blade propeller.

THE M/V Giant, a 180 ft. ocean going tug and salvage vessel is the first of five to be put into commission by Royal Crown Towing Co. of Nassau, B.I. It is powered by a pair of Cooper-Bessemer, model GSB-8 turbocharged, marine diesel engines plus two Cummins 60 kw generators, one Fairbanks, Morse 100 kw set and a GM 8-26 8-A 300 kw generating unit, for power to dead ships.

MIAMI Branch of Detroit Diesel Div. delivered a model 3-53 (58 cont hp at 2200 rpm), to Schultz Bros. of Fort Myers, to power a Couch pump and a 6-71 model (142 cont hp at 1800 rpm), to I. P. Cross Construction Co. near Lake Okeechobee, for a 36 in. Couch turbine

WORKING out of West Palm Beach, the newly constructed, 103 ft., Vecca, a hydrographic ship, skippered by Capt. Raymond Thomsen, is powered by a pair of D-353 Caterpillar marine diesel engines driving through Twin Disc marine gear, plus D-311 Caterpillar 30 kw generating sets.

REPOWERED at Dade Drydock, the Coast Guard vessel, W 299, with a pair of 6-NKDBSM Waukesha marine diesel engines developing 390 hp at 1200 rpm, plus Snow Nabstedt 2.56:1 r&r gears and a Cuno oil filter for the gear box.

GRADALL model 2460 was delivered to A. J. Capeletti, road contractors and also one for the Rayall Company. These are powered with General Motors 3-71 diesels and have Borg & Beck clutches and Commercial hydraulic pumps.

A TD-9 International Harvester dozer powered with the new UD-282 turbocharged International diesel, went to Tracy Harris of Tampa while A. J. Capeletti of Hialeah took delivery of an International TD-6 crawler dozer. Both came from Florida Georgia Tractor Co.

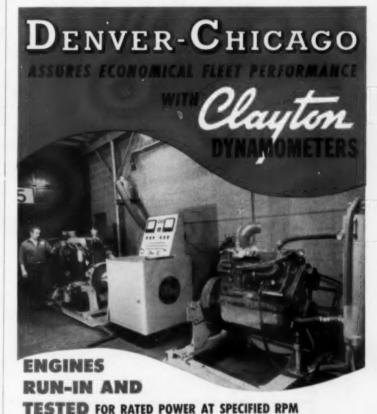
THE A K L, a 176 ft. island freighter made her maiden voyage to Nassau under the vessels new owners, Interinsular Mails Ltd. of Nassau, B. I. Powered by a pair of GM 6-268-A diesels the craft makes 11 knots loaded and takes 15 hours for the trip.

THE PEPPERMINT, a new type, 35 ft. catamaran, designed by Ned Mairs. for F. Matheson of Coconut Grove, had a pair of D-320 series A Caterpillar marine diesel engines installed with model FD-151 Flexidrive units. These four cylinder Cats, rated 105 hp at 2400 rpm

were supplied by Shelley Tractor & Equipment Co., Miami.

MIAMI Heart Institute received from the Miami Branch Detroit Diesel Div. a 100 kw Delco emergency generating set powered by a GM 6150-E diesel. They also delivered a 115 kw Delco generator powered by a similar unit to the Morton Towers of Miami Beach.

AVAILABLE MAY 15th! The completely new 1961 edition of the DIESEL AND GAS ENGINE CATALOG, Volume 26, con be purchased. If you design, purchase, operate or service diesel, dual fuel, or engines, the Catalog is essential to and your business. This giant, 608 you and your business. This giant, 608 page,  $10\sqrt{2} \times 13\sqrt{2}$ ", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover and costs just \$10 postpoid anywhere in the world. Send checks, money orders or company orders to DIESEL AND GAS ENGINE CATALOG, 9110 Sunset Blvd., Los Angeles 46, Calif.



VEHICLES REGULARLY TESTED

THROUGHOUT SPEED AND POWER RANGE FOR TOP OPERATION



The D-C story of high operational efficiency begins with management's demand for optimum road performance from every truck in its huge fleet. To insure this performance, Denver-Chicago uses the Clayton ENGINE DYNAMOMETER to power-test every rebuilt engine before returning it to service; employs the Clayton CHASSIS DYNAMOMETER to regularly 'road test" every vehicle to assure maximum fuel economy, uninterrupted schedules, and extended vehicle life.

data and complete product in Form C-1045 for Chassis Dy Catalog; Form C-762 for Eng Dynamometer Catalog.

443 North Temple City Boulevard / El Monte, California

# DEPENDABLE POWER from American MARC

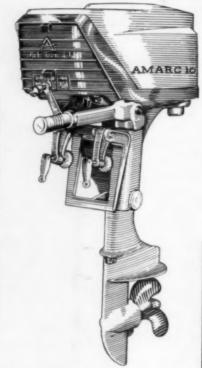
The World's First and only Diesel Outboard Engine; opposed piston, 9-1/4 hp AMARC 10.



Model AC-1: Air-cooled, one cylinder, 7.5 hp engine. Also available water cooled.



Model WD-2: Water-cooled, 2 cylinder, 25 hp engine.



American MARC Diesel Engines are American made, designed to reduce weight and size, to provide long life, dependable power; power that is easily portable in a horsepower range from 5 to 25 hp. The first Diesel Outboard illustrates American MARC'S exceptional engineering and manufacturing ability in this field. Other dependable products are one and two cylinder, air and water cooled diesels, three types of generators from 1/2 to 100 kw and diesel-electric generator sets.



WAM Series: 8 KW generator set, powered by Model AC-2 aircooled 15 hp engine.



Model WC-2: Water-cooled, 2 cylinder, 16 hp engine. Also available air-cooled.



Model GAC-2: Natural gas engine, 2 cylinder, 14 hp engine.



Model WC-2: Power unit radiator cooled with clutch and stub shaft, 16 hp.



Exploded view of a Static Excited Generator showing rotating field and stator.



Exploded view of a Permanent Magnet Generator showing rotating field and stator.



Model OP-18-2.5: 110 v, 400 cycle, 2 1/2 kw generator set powered by an air-cooled, opposed piston dieselengine. Total unit weight—125 lbs.

#### AMERICAN MARC, INC.

1601 West Florence Avenue, Inglewood, California ORegon 8-7174 CABLE 'DIESELS' Write, wire or phone for complete information about American MARC Dependable Power. Distributors in major marketing areas of United States, Canada and Latin America. Representatives in the Near East, Far East, Europe and The United Kingdom.

#### **Woodward President**

Billy M. Bittle, Jr. has been named president of Woodward Governor Co., Rockford, Illinois. He succeeds Irl C. Martin who had served in that





B. M. Bittle, Jr.

I. C. Martin

capacity since 1941. Mr. Bittle joined Woodward Governor Co. in 1945. In 1955 he became assistant general manager and in 1957 was made general manager. During World War II, from 1942 to 1945, he served as an officer in the Air Corps where he attained the rank of Captain. Under the direction of Irl C. Martin, who continues as board chairman, Woodward Governor Co. has maintained its position of leadership in the prime mover control industry and has expanded its operation throughout the world with additional company facilities presently located at Fort Collins, Colo.; Schiphol, Netherlands; Slough, England; and Tokyo, Japan.

#### 21,000 BHP Engine By B & W

During late 1960 a new large Burmeister & Wain marine diesel engine was presented to shipping people from a number of countries. The interest shown in this engine is primarily due to the fact that the engine with its 10 cylinders is said to be the most powerful marine diesel engine in existence. It is capable, in daily service, of developing 21,000 brake horsepower and may be overloaded for unlimited periods by 10 per cent. For limited periods the overload may rise up to 20 per cent. Thus, on the test bed the engine has developed 25,200 bhp. The 21,000 bhp engine is the first of nine for installation in tankers of 45-50,000 t. dw. capacity. Six of these engines are to be built in Copenhagen and five of them have been ordered



by Sigval Bergesen d.y. These five engines-including the one already built-are all to be installed in 50,000-ton tankers which Rosenberg Mekaniske Verksted, Stavanger, is to build for Sig. Bergesen d.y. & Co. Cylinder dimensions of this new engine are: bore 840 mm (33.07 in.), length of stroke 1,800 mm (70.86 in.). The 21,000 bhp are produced at 110 rpm and a mean indicated pressure of 9.5 kilos per sq. cm. The engine proper, which is in cast design, weighs 830 tons. In welded design the weight would be about 750 tons. Fuel oil consumption at full load is abt. 158 g/bhphr., and the lubricating oil consumption abt. 0.3-0.4 g/bhphr. Mechanical efficiency with full turbocharging by B&W's turbocharging system is approx. 90% at full load.

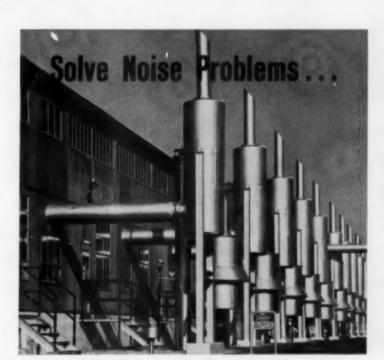
#### **Bennett New Whitlock President**

The Board of Directors of the Whitlock Manufacturing Co. have elected Gordon Bennett president of the company. Mr. Bennett, formerly executive vice president, succeeds Waldron C. Beekley who is retiring. The Whitlock Manufacturing Co., West Hartford, Conn., are de-



Gordon Bennett

signers and manufacturers of heat transfer equipment. In 1959 Whitlock became a partially owned subsidiary of Schutte and Koerting Co.



#### ... with a MAXIM ENGINEER on your team

There's no need to go-it-alone when your design problem deals with noise suppression. You can save time and money by putting a MAXIM engineer on your team.

He is a specialist in designing silencers to meet noise problems of all types of engines from giant diesels to "go-karts," as well as special purpose silencers for jet aircraft, atomic submarines, waste disposal plants, chemical plants and heat recovery applications.

Let us know your problems . . . we will work with your engineers . . . on your team . . . to solve them.

Immediate delivery on most standard type silencers from regional stocking points. Write or call today.



#### THE J. B. BEAIRD COMPANY, INC.

A Subsidiary of American Machine & Foundry Company Headquarters: P. O. Box 1116 Shreveport, Louisiana Plants: Shreveport, Louisiana Clinton, Iowa

Sales agents in all principal cities and foreign countries.

#### Diesel For Tunnel

They said it couldn't be done but they did it. For years road construction engineers have been arguing about whether or not they could build a tunnel in low-lying South Florida and use it without the danger of flooding during a heavy rain storm. The new tunnel, in the heart of the city of Fort Lauderdale, cost about \$61/2-million and was recently opened to traffic. It will whisk the busy highway traffic on U.S. No. 1 under the New River. In case of a power failure or a heavy flooding rain, a White Superior, model 40-SX-8 diesel generating set was installed. This 712 hp at 900 rpm diesel, shown during installation, supplies power for the General Electric 500 kw, 60 cycle,



480 volt generator. The unit is for standby use to pick up the tunnel's complete electrical load for lighting, ventilation and the 3000 gpm sump pumps. All the equipment is located in the South ventilation building of the tunnel.

#### Oil Conditioner

A new oil conditioner and residual gum solvent designed to improve diesel engine performance has just been announced by Winslow Engineering and Manufacturing Co. Known as CP-Conditioned Power -the product according to Winslow officials also re-



sults in lower fuel and oil consumption, while helping to increase engine life through reduction of friction. CP. it is stated also releases sticky valves and lifters and protects metal from carbon deposits, rust and corrosion. For free literature on CP oil conditioner and residual gum solvent, write Winslow Engineering and Manufacturing Co., 4069 Hollis St., Oakland, Calif. (ITS NEW)

#### Vertical Diesel for Pump



for a tin mining operation near Singapore, Malaya. Unit was designed and manufactured by Stewart & Stevenson Services of Houston. Geared specifically for mining operation, the unit represents the first vertical application of a GM Detroit model 8V-71. The engine is combined with a specially designed Stewart & Stevenson "pancake" type reduction gear which permits direct connection to the customer's 600 rpm pump. Installed, unit stands about 71/2 ft. high and weighs approximately 16,000 lbs. including pump. Purpose of the equipment, when combined with the pump, will be for dewatering operations.

AVAILABLE MAY 15th! The completely new 1961 edition of the DIESEL AND GAS ENGINE CATALOG, Volume 26, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 608 page,  $10\frac{1}{2} \times 13\frac{1}{2}$ ", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover and costs just \$10 postpaid anywhere in the world. Send checks, money orders or company orders world. Send checks, money orders or company orders to DIESEL AND GAS ENGINE CATALOG, 9110 Sun-



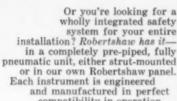
Vertical diesel engine will provide precise power

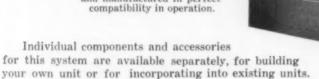


So you want a simple, reliable shutdown switch if lube oil gets too low or jacket water gets too hot? Robertshaw has it — including an explosion-proof model, if desired.



Or you need a dependable gage with easy-to-read dial and solid-front safety?
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Large or little?-Whatever the size of your installation, whatever the nature of your engine control problem, our engineers have a world of answers. Get the complete story of Robertshaw engine controls by requesting our new Catalog GD-H.



FULTON SYLPHON DIVISION . KNOXVILLE 1, TENN.

#### Towboat, Maura-O

The towboat, Maura-O, designed by Coast Engineering Co., of Norfolk, Va., and built by the Bern Shipyard at New Bern, N. C., has gone into service for the Edison Shell Co., at Ft. Meyers, Fla. The boat is 50 ft. long, has an 18 ft. beam and draws 5 ft. of water. The vessel has a single deck and is twin screw propelled by GM 6-71 diesel engines rated 147 hp each through Twin Disc model X9212A reversing gears with 4.38:1 ratio. Engines are keel cooled and controlled from the pilot house by a Westinghouse Air Brake system. The pilot house has an eye level of 17 ft. to facilitate vision for this type of pusher towboat. On river trials the Maura-O had an average speed of just over 15 mph.

#### **Buessing Enters U.S. Market**

Buessing, German producer of diesel trucks and buses, has signaled entry into the United States transportation market with an announcement by Klaus Egger-Buessing, Vice-President of Buessing Automobilwerke, of Braunschweig, Germany, and Robert H. Peterson, Buessing representative for the United States. The entire line of Buessing trucks, buses, chassis, and vertical and underfloor diesel engines will debut in the United States before the end of 1961. Buessing trucks have gyw ratings to 65,000 lbs., and gcw ratings to 120,000 lbs. The busses will be offered in various sizes and wheelbases and will have passenger capacities to 160 passengers. The 1961 engine models range in power from 119 hp to 214 hp.



Buessing official points to the underfloor diesel engine of model LU55, the first Buessing truck being distributed in the United States. This engine develops 119 hp and has a displacement of 331 cu. in. The LU55 has a GVW rating of 22,487 lbs.

Buessing Pacific Corp. of Belmont, Calif., has been named distributor for the eleven Western states. Initial marketing will begin with the introduction of the Buessing truck model LU55, with a gvw rating of 23,000 lbs. and underfloor diesel engine developing 119 hp. Buessing underfloor and vertical diesel engines will be marketed for replacement purposes through a dealer system. By October of this year, Buessing expects to be supplying the American market with 80 to 100 diesel engines of 2 to 5 ton capacity per month. Buessing is currently negotiating for the lease of an assembly plant on the West Coast. Many of the Buessing truck models will have American-made components, such as axles, transmissions, suspension, and bodies of custom design.



High quality and dependable performance of YA Heat Exchangers is symbolized by their selection for cooling the lube oil and jacket water on the White Superior Diesel 500KW engine-generator units which provide the prime power for operation of the "hardened" underground bases for the Atlas ICBM. Heat exchangers of the fixed bundle type are available in sizes to 8" diameters...removable bundle units in sizes to 31" diameters.

WRITE TODAY FOR BULLETINS HT-1-B AND HT-5



#### Fairbanks-Morse Appointment



Glenn A. Parker, manager of the Kansas City sales branch of Fairbanks, Morse & Co. for the last six years. has been appointed assistant to the vice president. marketing, for the central region, and has assumed his new duties in Chicago. Mr. Parker joined Fairbanks, Morse in Kansas

City in 1942. He served seven years as a field engineer and five years as manager of the branch's diesel department before becoming branch manager in 1954. In his new position, he will oversee the execution of corporate policies in the central marketing area by the company's divisions that produce pumps, diesel engines, electric motors, scales, compressors and electronic products.

#### **Barge Cleaning Plant**

Clark Marine Corp., of Baton Rouge, La., have recently put into service on the Mississippi River one of the most modern ship and barge cleaning plants in the United States. This vessel, named the Jane K. Clark has a hull 100 ft. by 36 ft. by 8 ft., all welded steel. Since the cleaning operations require large quantities of clean water and steam, the vessel includes a large steam plant, water purification equipment and two diesel 100 kw generator sets for furnishing power to operate the auxiliaries and for lighting. The 700 hp steam plant consists of four Clayton 175 hp, fully automatic, oil fired steam generators for operation on fuel oil of various grades up to #5. These generators have a thermal efficiency of 80 per cent and will come up to full pressure from a cold start in three minutes. They require about onefourth the space of the conventional boiler plant of the same hp rating. There are three large water filters and two water softeners to remove impurities from the river water.

#### **New Flexible Couplings**

Standard-duty type CQ and heavy-duty type HQ couplings are available with maximum bores from at 100 rpm. Type HQ maximum bores range from rpm. For additional information, contact Lovejoy Flexible Coupling Co., 4867 West Lake St., Chicago

flexible couplings that incorporate one set of jaws in removable ring form, permitting both independent rotation or radial removal of connected machinery, are now available from Lovejov Flexible Coupling Co. This feature is advantageous on diesel engine applications where the driven machinery must, on occasion, be disconnected for service work. The couplings employ individual free-floating load cushions of material suited to the particular application. Since the full load is transmitted through cushion compression only, there is no wear on the metal jaws. Lubrication is never required. Pulling a removable jaw ring outward provides enough clearance for independent rotation of either end of the coupling. Simply by reversing a set of cap screws from one body to the other, connected machinery can be removed radially without disturbing power transmitting elements of the coupling. Type CQ Lovejoy flexible 13/8" to 51/9". They range from 2.58 hp to 156 hp 13/4" to 81/2", horsepowers from 7.77 to 810 at 100

#### **Locomotives For Mexico**

Mexico is the destination of this Fairbanks-Morse 1600 hp all-purpose diesel locomotive, one of nine of its kind being built at Beloit, Wis., for Ferrocarril Chihuahua al Pacifico (Railroad from Chihuahua to the Pacific). A tenth locomotive will be a 1200 hp switcher. Back in 1955 Fairbanks, Morse sold the Mexican government 13 of these 1600 hp locomotives for freight service out of Chihuahua to the Continental Divide. In the last two years the line has been extended down the west slope to the Pacific port of Topolobampo, creating the need for three passenger and six more freight locomotives.



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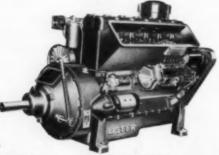
Model HB2 24 HP @ 2000 RPM



Model HB3 36 HP @ 2000 RPM



Model SL4 20 HP @ 2150 RPM



Model HB6 72 HP @ 2000 RPM

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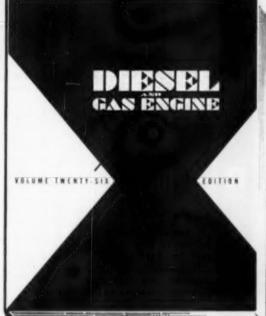
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#### **New Dieselpak**



Regular Dieselpak "500", a new Luber-finer replacement pack, has been introduced by Luber-finer. Inc. for use in diesel trucks having up to 5 gallon crankcase capacity. Developed expressly for cleaning H. D. compounded oil, the pack is said to remove both solid and colloidal im-

purities without adversely affecting the additives. The Regular Dieselpack "500" has been engineered for truck operators who schedule frequent oil and pack changes. For normal over the road operation, from 4,000 to 7,000 mis. of service is claimed. Complete information on the new Dieselpack is available from Luber-finer, Inc., 2514 So. Grand Ave., Los Angeles 7, Calif.

#### Modified Angle Compressor

Clark Bros. Co. has announced a new modified version of its model TLA gas-engine-driven compressors for the 1500 - 3000 bhp range. Designated model TBA, the new unit with 17 in. x 17 in. bore and stroke will supplement the TLA in intermediate horsepower steps. It will be built in five, six, eight and 10 power cylinder models rated at 1500, 1800, 2400 and 3000 bhp respectively. TLA units are rated at 1700, 2000, 2800, and 3400 bhp. Numerous major components including the lower crankcase, crankshaft, power pistons, com-



pressor cylinders and running gear are the same as in the model TLA. TBA operating characteristics are the same as the model TLA in all respects, except that it is a shorter stroke machine. Detailed information on Clark model TBA can be obtained by requesting Bulletin 206 from Clark Bros. Co., Olean, N. Y.

#### Solar Vice President

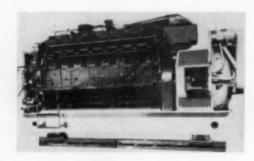
W. D. Bryson has been elected a vice president of Solar Aircraft Co., a subsidiary of International Harvester Co. Bryson will have responsibility for coordination of Solar's engineering and production activities in a staff capacity. He has been manager of manufacturing research at

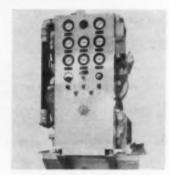


V. D. Bryson

Harvester since April, 1955 as a chemist in 1933.

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Above photos show White Diesel Engine Company's Superior Model 40-SK-8 Generating unit mounted on Vibration Mountings and Controls type SFHN-9, internal adjustment, nine spring "Spring Flex" mountings with control panels mounted on captive neoprene in shear style DR-80 mountings. These generating units were supplied to Corps of Engineers, Kansas City, Missouri for installation at Atlas Missile bases which are strategically located across the United States from New York to California.

These Spring Flex vibration mountings were designed to provide 90% isolation in order to protect delicate equipment at these missile sites from being disturbed by vibrations transmitted from the Diesel Engine generator set. Other vibration mountings materials supplied to these sites include mountings for lighting fixtures, air handling equipment, cable tray supports, batteries, dust collectors and compressors, as well as flexible pipe sections.

Vibration Mountings & Controls, Inc. are ready to assist your company at all times in designing shock and vibration control devices whether it be for the missile program or for commercial applications. Telephone or write today for complete "Vibration Control Data Book." Representatives in all major cities and in Canada.

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#### Florida Trawler



The Uncle Billy, a 68 ft. Florida type shrimp trawler, was recently launched by Diesel Engine Sales of St. Augustine, for Sam Snodgrass. It has a beam of 18½ ft. and for propulsion has a model D342 Caterpillar diesel engine with a max. hp rating of 210 at 1225 rpm. The Cat diesel swings a four bladed 50 in. diameter, variable pitch Columbian propeller through a Twin Disc 3:1 r&r gear. The engine room provides excellent accessibility to all machinery. Other engineering equipment included were Goodrich rubber cutless stern bearings, and 7200 gal. capacity fuel oil tanks. A 2 kw Onan auxiliary generator powered by a Petter diesel is also in the engine room.

#### Name 4 in Marketing Department

C. W. Onan, president, Onan Division of Studebaker-Packard Corp., Minneapolis electric generator manufacturer, has announced four promotions in their Marketing Department. Roy E. Mullin, formerly vice president in charge of Sales, has assumed broader responsibilities. His new title is







W. J. Auger

vice president in charge of Marketing. William J. (Bill) Auger, who was sales promotion manager, has been named assistant general sales manager. Auger's responsibilities include direct sales activities in all Onan markets: domestic, international, original equipment and special products. George R. Burda, Onan advertising manager, has been promoted to manager, sales administration. He will coordinate and administer sales policies and pro-



G. R. Burda



David Onan II

grams. David Onan II, manager of product planning, has been given responsibility for advertising, sales promotion, market research and product planning. His new title is Manager of market planning and promotion.

#### **Diesel Service Vice President**

George D. Nusbaum, president of Diesel Service Co., has announced that Robert M. Whelan has joined the organization as vice president and general manager. Diesel Service Co., Minneapolis, Minn. is a warehouse distributor for American Bosch, Robert Bosch,



R. M. Whelar

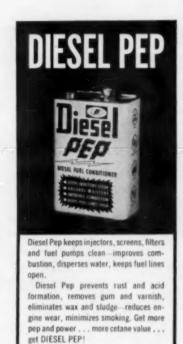
dix Scintilla, and other automotive and diesel fuel injection products. Mr. Whelan was formerly with the commercial sales division of American Bosch Arma Corp., Springfield, Mass., where he was manager of contract sales and was manager of aftermarket sales for American Bosch Division. He will also direct sales activities of an associated concern, Fuel Injection and Electric Co. of Milwaukee, of which Mr. Nusbaum is also the proprietor.

#### Split-Shaft Power Take-Off

A new power take-off capable of transmitting full engine power to operate accessory equipment has been announced by the Waterous Co. This new model is a more compact version of the model TM power take-off announced last year. It incorporates the same quiet helical gears used in the Waterous fire pump line, and is built to take the high loads and rugged duty encountered in the fire service. The model TML is especially designed for use where short wheel base chassis pose problems with drive-line angle and ground clearance. With a shorter gear case than most full-torque pto's, this unit provides sufficient ground clearance for trucks that must travel off the highways and over rough terrain. A 3-point mounting system permits the pto to move with the frame and frame deflection cannot cause stress in the pto. Ratios of 71, 88, 104 and 129 per cent of input are available with right hand output shafts forward, rear, or both. Output shafts have counter-enginewise rotation. In addition to an Electro-Matic shift, a variety of optional accessories are available with this pto including: Tachometer, governor, and speedometer drives; 9 x 3 or 12 x 5 in. factory-mounted Bendix brake; extra-heavy duty (2 in.) drive shafts; and a special drive shaft incorporating a "slip" spline. Further information on the model TML power take-off is available from the Waterous Co., 80 East Fillmore Ave., St. Paul 7, Minn.

ITS NEW

AVAILABLE MAY 15th! The completely new 1961 edition of the DIESEL AND GAS ENGINE CATALOG, Volume 26, can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel, or gas engines, the Catalog is essential to you and your business. This giant, 608 page,  $10\frac{1}{2}$  x  $13\frac{1}{2}$ ", fully illustrated reference book has been rewritten, revised and brought up to date completely from cover to cover and costs just \$10 postpaid anywhere in the world. Send checks, money orders or company orders to DIESEL AND GAS ENGINE CATALOG, 9110 Sunset Blied Los Angeles 46. Calif





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#### **Generator Line Listing**

The entire line of Onan electric generating plants is listed on a single black and white catalog sheet, recently issued. Illustrated and described are units from the smallest, portable electric plant (500 watts) to the largest emergency dieselect (230,000 watts). The new literature, Form A-388, is available from Onan Division of Studebaker-Packard Corp., 2515 University Ave. S. E., Minneapolis 14, Minn.

#### **New Sales Office**

Donald T. Koch was appointed manager of the new Detroit branch sales office of the Cooper-Bessemer Corporation of Mount Vernon, Ohio. The office, will serve eastern Michigan and northwestern Ohio areas of the Corporation's East-Central Sales District.

#### **New Diesel Tractors**

Daggett Truck Line, Frazee, Minn. has taken delivery of six International model DCOF-405 highway tractors as part of a fleet replacement and expansion program. The new tractors have been placed in service pulling 41 ft., drop-center livestock trailers in which full-grown beef cattle are double decked. Thousand-pound cattle are loaded 40 to a trailer. Specifications of the six International DCOF-405's include 140-

inch wheelbase, 11,000-pound front axles, five-speed transmissions, 220horsepower diesel engines and 72-inch sleeper cabs.

#### **Turbine Test Stands**

Orders for 25 mobile gas turbine test stands and 90 engine analyzers have been received by The Garrett Corporation's AiResearch Manufacturing Division. The new self-contained units provide a portable trouble shooting test bed for any of the numerous current or projected gas turbine engines built by Ai-Research for Navy auxiliary power use. AiResearch engine analyzers are furnished separately in "suitcase" configuration. These may be used independent of the stand to provide complete checkout of aircraft, trailer, or tractor mounted AiResearch-Navy turbines. Used with the stand they serve as its control and readout panel. Weighing 2100 lbs., the complete test unit is approximately 12 ft. long by 6 ft. wide. It is towed by standard Navy vehicles. The gas turbine engine analyzer, contained in a compact (101/2x191/4x221/2-in.) package, weighs 45 lbs. Its portable case contains all instruments, controls, switches, indicating lights and connections needed for complete, independent field maintenance and trouble shooting on any AiResearch turbine in Navy use.

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BUDA DD \$795.00 115 H.P., 6 cyl., 2.5:1 Reduction

GM6-71 from \$1000.00 165 H.P., 6 cyl., 1.5:1 Reduction

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### Mid-West Diesel

By L. H. Houck

BOTKIN Lumber Co., Farmington, Mo., an International UD-554 power unit for sawmill operation, from Missouri-Illinois Tractor Co., Hazelwood, Mo.

MISSOURI Petroleum Co., Overland, Mo., a Hough Payloader, H-120, with 4-in-1 bucket, Cummins 300 hp diesel. NRT-6-BI. Sale by Missouri-Illinois Tractor Co., Hazelwood, Mo.

SIX 170 hp Mack Thermodyne dieselpowered tractors, model H-67-T to Aunt Fanny's Baking Co., Atlanta.

ENGINES, Inc., Chicago, dealers for Ford and Lister diesels, has installed a 5000 watt Winpower generator powered with a Lister SL2 air-cooled diesel, in a refreshment truck.

INLAND GM Diesel, Inc., Milwaukee, has installed two additional 4-71E GM diesels in International CO-205 chassis for Brillion Rent-A-Truck, Inc., Brillion, Wis. Inland delivered through its Appleton, Wis., dealer, Baur Truck Co.

SPEEDWAY Transports, Inc., Kenosha, Wis., has installed four more GM 6V-53 diesels in auto transport trucks used to carry autos between Kenosha and southeastern parts of the U. S. Sale by Inland GM Diesel, Inc., Milwaukee.

EDMOND Leasing Co., Edmond, Okla., an 820 John Deere diesel tractor with Hancock scraper from Oklahoma City Equipment Co.

PAUL A. Foster, Norman, Okla., has taken delivery of a John Deere ICD 440 with GM 2-53 diesel-a crawler-from Oklahoma City Equipment Co.

ENGINES, Inc., Chicago, has installed a Lister SL2 air-cooled diesel in a Plaster-Master plastering machine.

INLAND GM Diesel, Inc., Milwaukee, has converted a Galion motor grader owned by the Sauk County Highway Department, Baraboo, to 4-71 GM diesel, which made a good name for itself when christened in some record snows.

CITY of Kaukauna, Wis., has taken delivery of a trailer mounted GM 125 kw diesel generator set, from Inland GM Diesel, Inc., Milwaukee. The completely hooded unit is self-contained and is to be used in the civil defense program.

HOLLOWAY Construction Co., Oklahoma City, has taken delivery on a John Deere crawler with 2-53 GM diesel engine, from Oklahoma City Equipment Co., to be used in general construction work

SOUTHWESTERN Illinois Coal Corp., Percy, Ill., has taken delivery on a T-500 Galion grader with a Cummins JN-BI diesel, from Missouri-Illinois Tractor Co., Hazelwood.

INTERNATIONAL TD-25 with cable dozer to Struebbe Excavating Co., Washington, Mo. from Missouri-Illinois Tractor Co., Hazelwood.

GALION model 118 motor grader with International UD-554 diesel to Ralls County Court, New London, Mo., from Missouri-Illinois Tractor Co., Hazelwood, Mo. (St. Louis).

EMERGENCY standby electrical service for Manitowoc (Wis.) County Jail and Traffic Center, is now provided by a new heat exchanger cooled General Motors diesel generator set, 100 kw from Inland GM Diesel, Inc.

FOR a crushing plant being built for export, a GM 6031C diesel unit to Smith Engineering Works, Milwaukee, from Inland GM Diesel, Inc.

CHARTER test runs of Flxible 2-level coaches powered with GM 6V-53, 185 hp diesels, have been completed with excellent results by Prigge Charter Coaches, Inc., of Sheboygan, Wisc., reports Maynard W. Cole, president, Inland GM Diesel, Inc., Milwaukee, who made sales and installations.

INTERNATIONAL TD-20 with hydraulic dozer to Boettecher Epple, Bland, Mo., from Missouri-Illinois Tractor Co., Hazelwood, Mo.

#### **Perfect Circle Promotions**

Appointment of three new vice presidents for Perfect Circle Corp., has been announced. Appointees are G. R. Baer, vice president-Operations; A. M. Brenneke, vice president-Engineering; and W. J. Platka, Jr., vice president-International. Mr. Baer had been general manufacturing manager since August 1957, and assumed additional responsibilities as assistant general manager in June 1959. He had held both positions to the present. Mr. Brenneke had been Perfect Circle's chief engineer since 1954. Mr. Platka had been general manager of Perfect Circle's International Division since its formation in 1959. He is president of Platka-Export Co., Inc. and Western Hemisphere Trade Corp., both subsidiaries of Perfect Circle since 1959. and will supervise Perfect Circle international sales and distribution in more than 80 countries, and manufacturing operations in Canada, Mexico, Australia, Argentina and Brazil.

#### **New Survey Launches**

Paasch Marine Service has delivered two welded steel, diesel-equipped parrol and survey launches for the U.S. Army Corps of Engineers, Baltimore, Md. These launches were designed by Philip L. Rhodes, Naval Architects of New York, and built at Paasch's plant in Erie, Pa., under the inspection of the Buffalo,

(N. Y.) Corps of Engineers. They will be used principally for anti-pollution activities, the Wicomico being assigned to the supervisor of the harbor of Baltimore, and the Craney Island to the supervisor of the harbor of Hampton Roads. Both vessels are powered by GM 6-110 diesel engines driving through 1½:1 reduction gear. The propeller is a 3 bladed, 29, x 19 in Equipoise.



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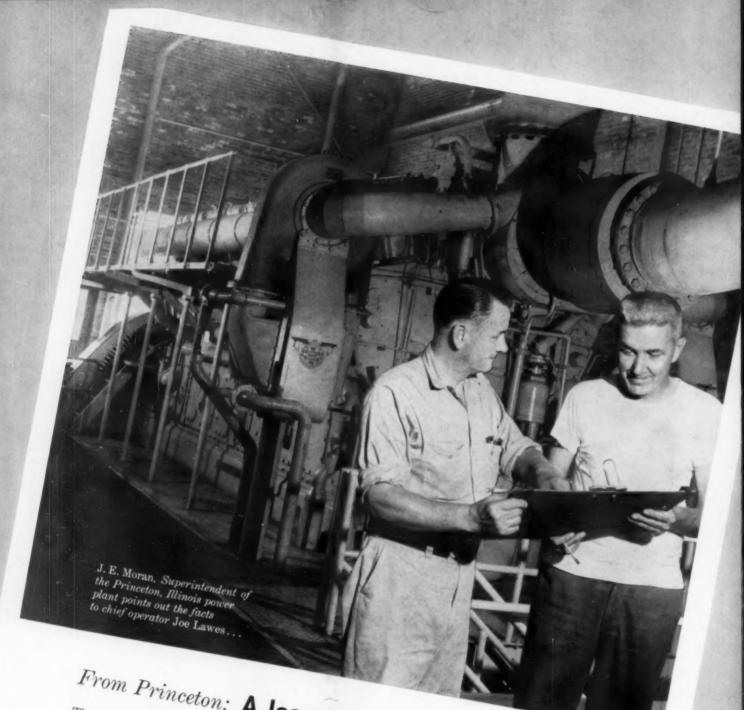
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